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Superfund Record of Decision (EPA Region 1)
Old Springfield Landfill, Vermont
(First Remedial Action), September 1988

(U.S.) Environmental Protection Agency, Washington, DC

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16. Abstract (Limit: 200 words)

The Old Springfield Landfill site is located approximately one mile southwest of the city center in Springfield, Windsor County, Vermont. The land use within a 1 mile radius of the 27-acre site is primarily low density residential housing, light agriculture, undeveloped forest land, and commercial development. The landfill was operated by the Town of Springfield between 1947 and 1968 for the disposal of municipal solid waste and hazardous industrial liquid and semi-liquid waste. The site is currently owned by Springfield Mobile Home Estates, which operates a trailer park currently consisting of 38 mobile homes. Approximately 60 people reside in the Springfield Mobile Estates trailer park, built on top of the landfill. The site first came to the attention of the Vermont Department of Health because of a complaint by a nearby resident of foul-smelling water. Investigation of the site found VOC contamination in a spring and in a residential well near the mobile home park. EPA began investigations at the site in 1976. Four areas of contamination have been identified at the site where industrial waste was either disposed of in discrete trenches or mixed with the municipal waste. This remedial action addresses landfill seepage and ground water contamination. The remedial action is designed for management of contaminant migration and study of final remediation alternatives. The primary → p2
(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision
Old Springfield Landfill, VT
First Remedial Action
Contaminated Media: gw, sw, soil, sediments
Key Contaminants: organics (PAHs, PCBs), VOCs (benzene, PCE, TCE, toluene)

b. Identifiers/Open-Ended Terms

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September 1988

EPA

Superfund Record of Decision:

Old Springfield Landfill, VT

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16. ABSTRACT (continued)

contaminants of concern affecting the ground water, surface water, soil, and sediments are VOCs including benzene, PCE, TCE, toluene, and other organics including PCBs and PAHs.

The selected remedial action for this site includes: construction of an underground collection system to collect leachate; installation of wells for extraction of contaminated ground water; onsite treatment of the collected leachate and extracted ground water, or discharge to the Publicly Owned Treatment Works (POTW) for treatment; institutional controls to restrict the use of ground water that exceeds MCLs; multimedia monitoring; and conducting additional studies to determine the feasibility of isolating waste materials from the ground water (e.g., french drain, slurry wall, or waste removal). The estimated present worth cost for this remedial action is $5,374,000 with annual O&M costs of $173,000.

Record of Decision

Old Springfield Landfill
Springfield, Vermont

STATEMENT OF PURPOSE

This Decision Document represents the selected remedial action for an operable unit for remediation of groundwater emanating from the seeps and known areas of groundwater contamination at the Old Springfield site developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan (NCP) 40 CFR Part 300 et seq., as amended. The Region I Administrator has been delegated the authority to approve this Record of Decision.

The State of Vermont has concurred on the selected remedy for the operable unit for seeps and limited groundwater and has determined, through a detailed evaluation, that the selected remedy is consistent with its laws and regulations.

STATEMENT OF BASIS

This decision is based on the administrative record which was developed in accordance with Section 113(k) of CERCLA and which is available for public review at the Springfield Town Library in Springfield, Vermont, and the EPA Region I Waste Management Division Record Center in Boston, Massachusetts. The attached index identifies the items which comprise the administrative record upon which the selection of a remedial action is based.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy for the Old Springfield Landfill site is a management of migration operable unit for seeps and, to a limited extent, groundwater.

1. Leachate Collection/Groundwater Extraction System

The method for collection of leachate will be an underground system which collects the groundwater at or upgradient of the points of seep emanation. The collection system will collect all ten of the detected seeps on the eastern slope and all four of the detected seeps on the western slope with provisions to collect any other seep should it develop.

In addition to leachate collection, groundwater will be extracted from the sand and gravel zone on the western portion of the site. The collected groundwater and leachate would be conveyed to a wastewater treatment facility.

Detailed criteria will be developed during remedial design to determine the best design and construction techniques for the leachate collection system and the best placement and number of extraction wells.

Underground leachate collection and groundwater extraction are the most effective means of capturing contaminated groundwater after it has migrated away from the source area. The system will allow for the addition of other seeps should there be additional breakouts during the duration of the remedy. Underground collection of leachate will eliminate the pathway for contaminants to volatilize at the seeps by collecting the seeps underground before contact with the air. Leachate collection will also reduce the potential for contaminants to travel into the Black River and Seavers Brook via surface drainage, thus reducing possible contamination of fish in those rivers. A non-continuous underground leachate collection system may be appropriate if it can be demonstrated during design to fulfill the following system objectives:

- collect groundwater on the eastern and western slopes which emanates from the landfill as leachate seeps in order to eliminate the contamination and potential contamination in uncontaminated seeps, migrating to Seavers Brook and the Black River and into the bedrock aquifer;
- extract groundwater on the western side of the site in the permeable sand and gravel unit;
- eliminate the volatilization and direct contact risk associated with the leachate seeps; and
- have collection and extraction systems in place which could be extended should new locations of contaminated leachate or practically extractable and contaminated groundwater be located.

2. Treatment of Groundwater and Leachate

The treatment system for the collected leachate and extracted groundwater will treat the collected leachate and extracted groundwater to meet all federal and state requirements. Treatment will be on-site. However, should the Publicly Owned Treatment Works (POTW) have the ability, capacity, and willingness to treat the extracted groundwater and leachate and meet all federal and state requirements, the collected leachate and extracted groundwater will be piped to the POTW and treated. If the collected groundwater and leachate is directed to the POTW, it will be pretreated if pretreatment is necessary to meet applicable standards, attain surface water quality goals and maintain effective POTW operations. If a demonstration of ability, capacity and willingness is not made, the treatment system will remain onsite.

The Town of Springfield has demonstrated the willingness and capacity to treat the collected leachate and extracted groundwater at the POTW, and has had a review of the system to evaluate if the system has the ability to handle the wastes. This initial evaluation indicates that the POTW may have the ability to treat the wastes. Samples of the collected leachate and extracted groundwater will be bench scale tested during design to ensure effectiveness.

3. Institutional Controls

The selected remedy includes restricting the use of groundwater where it may exceed Maximum Contaminant Levels (MCLs). EPA recommends to the State and Town of Springfield that they implement and enforce ordinance 88-2 passed by the Town of Springfield as an institutional control. Specifically, EPA recommends a prohibition on groundwater use in the area bounded by Route 11 on the east, Mr. Curtin's present property boundary on the south, Seavers Brook Road on the west and Mr. Curtin's present property boundary on the north until a time when groundwater levels reach MCLs. The ordinance is attached as Exhibit 1.

4. Monitoring

Monitoring of environmental media will be conducted for thirty (30) years to monitor effectiveness of the remedy and to identify any further impacts to human health and the environment. Additionally, as required by CERCLA at sites where any hazardous substances, pollutants or contaminants remain, a review of the site will occur every five (5) years.

5. Additional Studies

Additional studies will be conducted to determine the feasibility of isolating waste materials from groundwater through diverting groundwater flow around waste materials, creating physical barriers to separate waste materials from groundwater, landfilling of waste materials in a Hazardous and Solid Waste Amendments (HSWA) landfill, or other appropriate technologies. The additional studies will include but not be limited to:

1) and evaluation of the feasibility, effectiveness, and cost of isolating wastes from groundwater, including a detailed evaluation of:

   a. an upgradient, permeable vertical groundwater diversion structure similar in function to a french drain;

   b. physical barriers, such as a slurry wall, that separate waste material from groundwater and/or depress the water table to minimize contact between waste and groundwater;

   c. a means of lowering the water table in areas of waste disposal to eliminate or minimize contact between waste and groundwater;

   d. removing the waste, including that waste in contact with groundwater, for disposal in a HSWA landfill;

   e. removing the waste, including that waste in contact with groundwater, for treatment by incineration or vitrification;

   f. other means of isolating waste materials from groundwater; and

   g. combinations of the above.

2) a quantitative determination of the amount of infiltration and flow contacting buried waste from vertical infiltration and lateral groundwater flow. For each of the evaluations conducted in 1) above, quantitatively compare the amounts of infiltration and groundwater flow contacting waste through vertical infiltration and lateral groundwater flow before and after remedy implementation; and

3) an identification and characterization of outlying areas of potential contamination which may have escaped detection in earlier investigatory work including the western slope area between Seavers Brook Road and Will Dean Road and an area on the southwestern portion of the site near Will Dean Road, as indicated by the magnetic anomaly in Figure 3-3 of the Supplemental Remedial Investigation, to determine if there are additional source of contamination. If additional contamination is found, it will be remediated as part of the source control operable unit, or taken offsite for disposal in accordance with EPA's offsite policy.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this operable unit. Treatment of leachate and contaminated groundwater will occur at the POTW or onsite and will be the maximum extent to which treatment is practicable.

9/22/88
Date

Michael R. Deland
Michael R. Deland
Regional Administrator

OLD SPRINGFIELD LANDFILL RECORD OF DECISION
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Old Springfield Landfill Site
Record of Decision Summary

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EXHIBIT

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APPENDICES

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ATTACHMENT

Monitoring Well/Leachate Seep Data . . . . Attachment 1
Soil Data . . . . Attachment 2
Contaminants of Concern . . . . Attachment 3
Management of Migration . . . . Attachment 4

I. SITE NAME: Old Springfield Landfill
LOCATION: Springfield, Vermont
DESCRIPTION

The 27-acre Old Springfield Landfill site, is located approximately one mile south-west of the city center in Springfield, Windsor County, Vermont (See Figure 1). The site is situated on an upland terrace with slopes that descend steeply to the north, east, and west. Seavers Brook runs west of the site and the Black River runs east of the site. Seavers Brook flows northward until it reaches the Black River, which flows to the south and empties into the Connecticut River.

The Town of Springfield has a population of 10,180, according to the 1980 National Census. The villages of Goulds Mill and Hardscrabble Corner are located within a one-mile radius of the site. Approximately 60 people resided in the Springfield Mobile Estates trailer park located atop the site. A number of these individuals are believed to have sold their trailers during the summer of 1988; however, a limited number of resident remain in the trailer park. A condominium complex (Bluegrass Hills) was constructed adjacent to the site to the north. The condominium complex has 44 single-family units in six buildings with approximately 100 residents.

Approximately 15 homes are located within a one-half mile of the site, along with a few other commercial establishments. Three homes are on the terrace adjacent to the mobile home park. Approximately 200 homes and condominiums are located within a one-mile radius of the site, housing an estimated population of between 650 and 750 people.

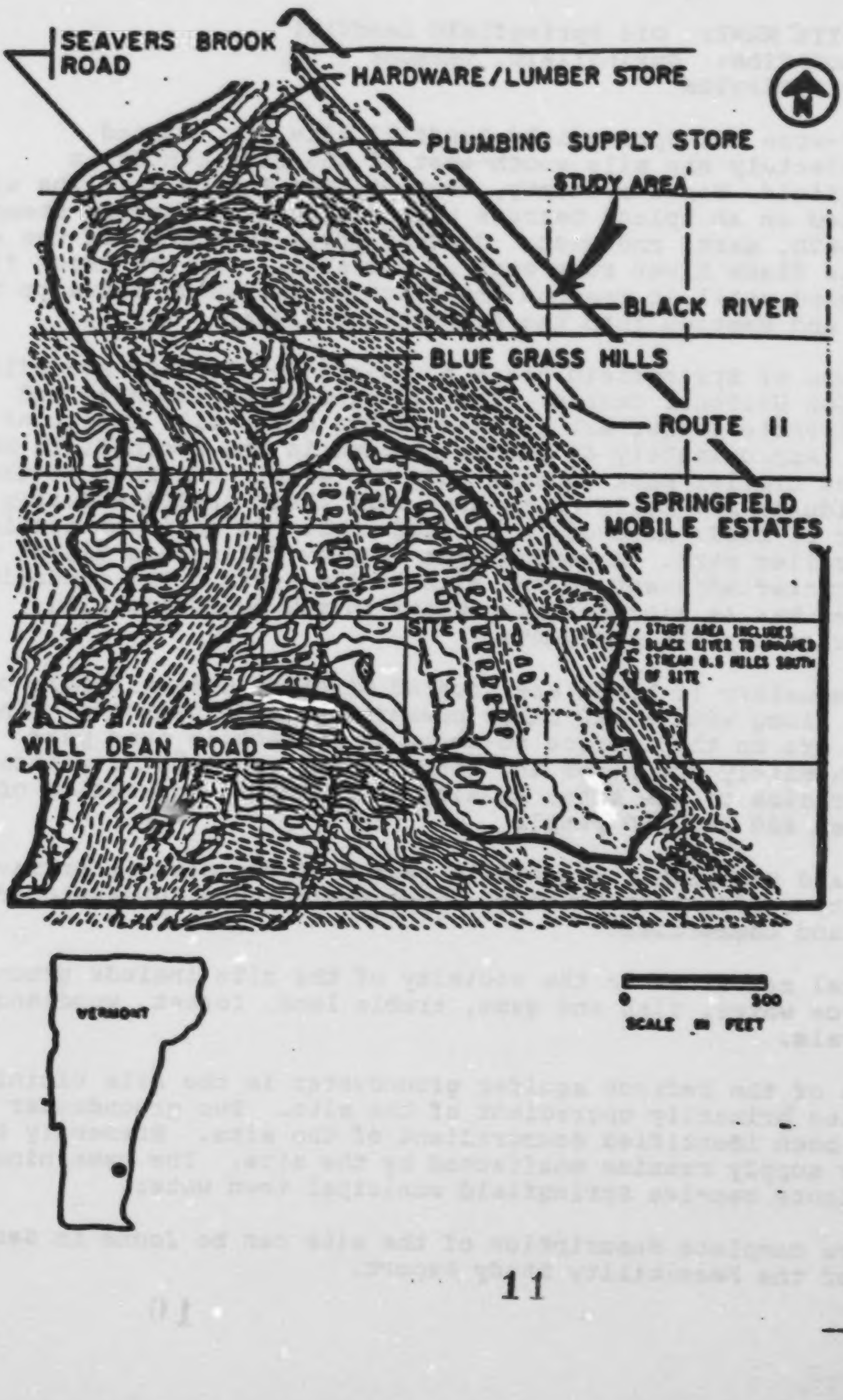
The land use within a one-mile radius of the site is primarily low density residential housing, light agriculture, undeveloped forest land and commercial.

Natural resources in the vicinity of the site include groundwater, surface water, fish and game, arable land, forest, woodland, and minerals.

Users of the bedrock aquifer groundwater in the site vicinity are located primarily upgradient of the site. Two groundwater users have been identified downgradient of the site. Presently their water supply remains unaffected by the site. The remaining residents receive Springfield municipal town water.

A more complete description of the site can be found in Section 1.1 of the Feasibility Study Report.

Figure 1. Site Location



II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Response History

The Old Springfield Landfill, also referred to as the Will Dean Dump, was operated by the Town of Springfield between 1947 and 1968. Hazardous industrial waste from local industries was co-disposed with municipal trash. Also, some of the industrial waste was disposed of in discrete trenches in addition to being mixed with municipal solid waste. Most hazardous material was disposed of in bulk liquid and semi-liquid form. Shortly after the site was closed in 1968 it was sold. The former landfill was developed for use as a mobile home park. At the time of the park's development, the Vermont Department of Health (DOH) recommended that drilled wells not be used to supply water to the park because the development was located over areas that had been used for chemical disposal. Municipal water lines were extended to serve the mobile homes. Springfield Mobile Home Estates trailer park currently consists of 38 mobile homes. A six-building condominium complex and 13 single family residences are located near the site of the Old Springfield Landfill.

Shortly after the opening of the Springfield Mobile Estates trailer park, a nearby resident's complaint about foul-smelling water prompted an investigation of the site by the Vermont DOH and the Vermont Agency of Environmental Conservation (VTDEC). In response to finding volatile organic compound contamination in a spring and the in residential well near the mobile home park, the spring was abandoned and an affected home near the mobile home park was connected to the public water supply.

EPA entered into the investigation of the Old Springfield Landfill site in 1976 to review VTDEC data on residential wells on the site. In late 1982, after the VTDEC requested that the site be reviewed for inclusion in the Superfund Program, the site was added to the National Priorities List of hazardous waste sites eligible to receive federal funding for study and cleanup. The results of EPA's initial Remedial Investigation (RI), released in September 1985, showed contamination in site soils, seeps, and ground-water. EPA determined that a supplemental RI was necessary to delineate the former waste disposal areas, and to better define the nature, extent, and potential adverse human health effects of site contamination.

Supplemental RI activities included taking samples from soil, leachate seeps, residential wells, groundwater, and sediment at the site. These activities included a soil boring program in the trailer park area. Because of the potential for mobile home park residents to be exposed to contaminants during this soil boring program, EPA temporarily relocated mobile home park residents between July 6 and July 18, 1987. EPA completed Phase I field investigations in October 1987, and Phase II in May 1988, and released the final RI report in June 1988. EPA has conducted the Phase II investigation simultaneously with the Feasibility Study, released in June 1988, to identify and evaluate cleanup alternatives for the site.

A more detailed description of the site history can be found in the Remedial Investigation, Supplemental Remedial Investigation Report section 1.2, and the Feasibility Study report at section 1.1.

B. Enforcement History

On January 6, 1984, April 17, 1987, and May 14, 1987, EPA notified nine parties who either owned or operated the facility, generated wastes that were disposed of at the site, arranged for the disposal of wastes at the facility, or transported wastes to the facility, of their potential liability with respect to the site.

In January 1984, EPA had discussions with Emhart Corporation, Textron Incorporated, the Town of Springfield and other Potentially Responsible Parties (PRPs) about installing a water line to two private homes and conducting the Remedial Investigation and Feasibility Study. Emhart Corporation, Textron Corporation and the Town of Springfield came to an agreement on the installation of the water line only. EPA then used Trust Fund monies to conduct the Remedial Investigation and Feasibility Study.

EPA met with a committee of potentially responsible parties several times between June 26, 1987 and September 19, 1987 to keep them apprised of findings at the site. EPA also met with a committee of potentially responsible parties on June 29, 1988 to present the results of the Feasibility Study and the Proposed Plan and on a number of occasions in July and August of 1988. On August 24, 1988 the PRPs submitted written comments on EPA's proposed plan. The comments have been included in the administrative record.

C. Community Relations

Through the site's history, community concern and involvement has been high. EPA has kept the community and other interested parties apprised of the site activities through informational meetings, fact sheets, press releases and public meetings.

In February 1985, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed about and involved in activities during remedial activities. In September 1985, EPA held an informational meeting in the town to describe the plans for Remedial Investigation and Feasibility Study.

On September 15, 1985 EPA held an informational meeting to describe the results of the Remedial Investigation.

On October 16, 1986, EPA held an informational meeting to discuss the Supplemental Remedial Investigation and Feasibility Study work plan.

Between July 6, and July 18, 1987, EPA held several meetings with residents of Springfield Mobile Estates to inform them of site conditions during the temporary relocation.

On March 29, 1988, EPA held a public meeting to discuss the results of the Supplemental Remedial Investigation and Endangerment Assessment.

On July 7, 1988, EPA held an informational public meeting to discuss the cleanup alternatives presented in the Feasibility Study and to present the Agency's Proposed Plan. The Agency also answered questions from the public during this meeting. From July 8 to August 24, the Agency held a seven week public comment period to accept comment on the alternatives presented in the Feasibility Study, the Proposed Plan, and all other documents previously released to the public. During that comment period, on July 21, 1988, the Agency held a public hearing to accept oral comments. A transcript of this meeting as well as written comments received, and the Agency's response to these comments are included in the attached responsiveness summary and are part of the Administrative Record. After the Record of Decision (ROD) is signed, EPA will publish notice of its decision in the local paper.

IV. SCOPE AND ROLE OF RESPONSE ACTION

The selected remedy addresses management of migration (or groundwater) technologies to obtain an operable unit for remediation of water emanating from the seeps and present in known areas of groundwater contamination. The remedy provides for the following components: leachate collection and extraction of groundwater; treatment of leachate and extracted groundwater; institutional controls; long-term monitoring; and additional studies. This remedy does not address the source of groundwater or air contamination. After additional studies, remedial actions designed to control the contamination source will be evaluated.

V. SITE CHARACTERISTICS

A complete discussion of the site characteristics can be found in the Remedial Investigation and Supplemental Remedial Investigation Reports.

Chapter One of the Feasibility Study contains an overview of the Remedial Investigation. The significant findings of the Remedial Investigation are summarized below.

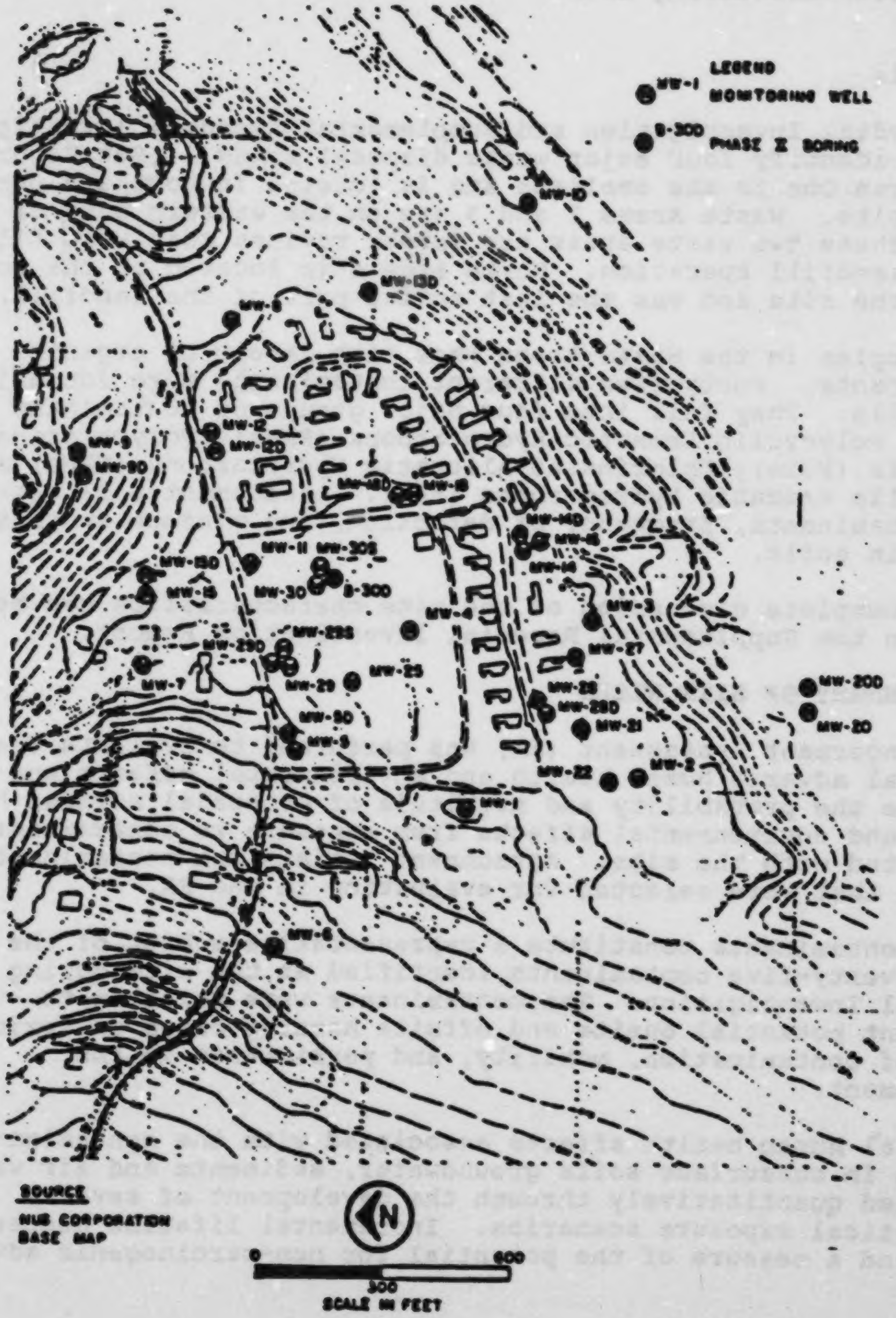
A. Hydrogeology/Groundwater

Hydrogeologic investigations were conducted at the site to characterize groundwater flow, contaminant transport and discharge to the seeps. A total of 36 monitoring wells (Figure 2) were installed in six geologic formations. Monitoring well water levels indicate that the hydrogeologic system is a sequence of unsaturated sands overlying low permeability, saturated glacial till which in turn is underlain by high permeability sands and gravel and fractured bedrock. The water-table surface is near the top of the glacial till over most of the site. Because of its low hydraulic conductivity, drainage from the till is slow, and the till is saturated over much of its thickness in most areas of the site. A localized, seasonally perched water table was observed in the western central part of the site. Beneath the till is the sand and gravel deposit which has a hydraulic conductivity nearly two orders of magnitude greater than the glacial till. The buried sand and gravel stream bed deposit acts as a drain, causing flow in the overlying glacial till to converge towards it.

Horizontal groundwater flow approaches the site from the south, but divergent flows to the east toward Black River and to the west toward Seavers Brook were observed in the immediate site vicinity. The most recent investigation determined that the site is a major recharge area and that there is a large downward component of groundwater flow.

The leachate seeps and springs on the outslopes of the site are major groundwater discharge zones. The major groundwater contamination at the site consists primarily of trichloroethene (TCE), tetrachloroethene (PCE), 1,1,1-trichloroethane (TCA), trans-1,2-dichloroethene, vinyl chloride, toluene, and total xylenes. The most concentrated of groundwater seep contamination was detected in two leachate seeps which flow from the face of the buried ravines in the eastern portion of the site near Waste

Figure 2. Monitoring Well Locations



SOURCE
NUS CORPORATION
BASE MAP

Area 3. Groundwater contamination is found in greatest concentrations beneath the southeastern portion of the landfill in the southeast corner of the site. Attachment 1 shows the groundwater monitoring data.

B. Soil

The Remedial Investigation and Supplemental Remedial Investigation Reports identify four major waste disposal areas. (See Figure 3) Waste Area One is the smallest and is located in northern portion of the site. Waste Areas 2 and 3 are on the eastern edge of the site. These two waste areas are former ravines that were filled during landfill operation. Waste area 4 is located at the southern end of the site and was the last active part of the landfill.

Soil samples in the Waste Areas show high levels of organic contaminants. Forty-five different contaminants were found in the site soils. They fall into four major groups of contaminant types. Polycyclic Aromatic Hydrocarbons (PAHs); Polychlorinated Biphenyls (PCBs); Chlorinated Aliphatic Hydrocarbons (CAHs) and Monocyclic Aromatic Hydrocarbons (MAH). Attachment 2 illustrates the contaminants, frequency of detection, and minimum and maximum values in soils.

A more complete discussion of the site characteristics can be found in the Supplemental Remedial Investigation Report.

VI. SUMMARY OF SITE RISKS

An Endangerment Assessment (EA) was performed to evaluate the potential adverse human health and environmental effects and estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the site. Attachment 3 lists the contaminants of concern that were selected for evaluation in the EA.

These contaminants constitute a representative subset of the more than seventy-five contaminants identified at the site during the Remedial Investigation. The contaminants were selected to represent potential onsite and offsite hazards based on toxicity, level of contamination, mobility, and persistence in the environment.

Potential human health effects associated with the contaminants of concern in subsurface soils groundwater, sediments and air were estimated quantitatively through the development of several hypothetical exposure scenarios. Incremental lifetime cancer risks and a measure of the potential for non-carcinogenic adverse

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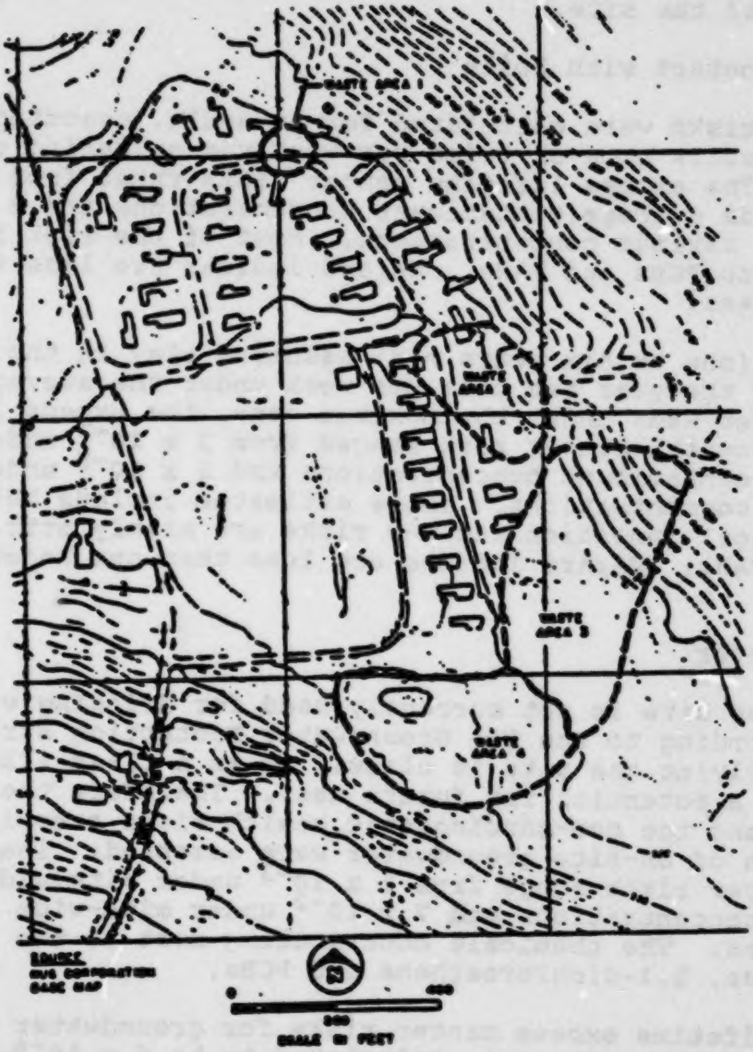
Figure 3. Waste Areas



SOURCE
[illegible] CORPORATION
BASE MAP

health effects were estimated for the various exposure scenarios. Exposure scenarios were developed to reflect the potential for exposure to hazardous substances based on the characteristic uses and location of the site.

a. Direct Contact with Soils

Human health risks were calculated for an adult, assuming contact with surface soils once or twice per week via gardening or other activities. The excess lifetime cancer risks range from 3×10^{-7} under site-wide average contaminant concentrations and 2×10^{-5} in the site-wide maximum concentrations. Most of the risk is attributable to PCBs and PAHs. Hazard indices are less than one under both cases.

For children (one to six years old) assuming play in the soil for six months of the year two time per week under the average case and 4 times per week under the maximum case, the excess lifetime on-site incremental cancer risk ranged from 1×10^{-7} under site-wide average contaminant concentrations and 2×10^{-5} under site-wide maximum concentrations. These estimates include both direct contact and soil ingestion and the risks are mainly attributable to PCBs and PAHs. Hazard indices are less than one under both cases.

b. Groundwater

Groundwater on site is not currently used for drinking water; however, according to the EPA Groundwater Protection Strategy the aquifer underlying the site is classified as a Class IIB aquifer (i.e. having a potential for future use). Therefore the lifetime cancer risk and the non-carcinogenic health risks associated with the ingestion of on-site groundwater were assessed. The excess lifetime cancer risks range from 1×10^{-3} under site-wide average contaminant concentrations and 7×10^{-2} under site-wide maximum concentrations. The chemicals contributing most to the risk are vinyl chloride, 1,1-dichloroethene and PCBs.

The future lifetime excess cancer risks for groundwater in the western area of the site were calculated to be 6×10^{-4} under average contaminant concentrations and 7×10^{-4} under maximum contaminant concentrations found on the western slope. Vinyl chloride and 1,1-dichloroethene contribute most to the risk.

c. Air

Risks due to inhalation exposure to landfill gas contamination and the volatilization of contaminants from leachate seeps were modeled. The landfill gas exposure route indicates an excess lifetime cancer risk of 9×10^{-5} under site-wide average contaminant concentrations and 5×10^{-3} under site-wide maximum contaminant concentrations. Chemicals contributing most to the risk are benzene, chloroform and trichloroethene. Using the assumption that the concentrations of contaminants in the air at the nearest off-site residence are the same as on-site, the average and maximum excess lifetime cancer risks are the same off-site as on-site.

Exposure risks from volatilized contaminants from leachate seeps indicate a lifetime excess cancer risk of 1×10^{-4} under site-wide average contaminant concentrations and 1×10^{-3} under maximum contaminant concentrations. Chemicals contributing most to the risk are vinyl chloride, 1,1-dichloroethene and 1,1-dichloroethane.

d. Surface Water

Excess lifetime cancer risks associated with current consumption of fish from the Black River based on concentrations estimated from the mass balance model are 3 x 10-8 and 2 x 10-6 for the average and plausible maximum cases, respectively, with nearly all of the risk attributable to PCBs.

A complete discussion of risks can be found in Section 1.4 of the Feasibility Study and the Endangerment Assessment.

VII. DOCUMENTATION OF SIGNIFICANT CHANGES

EPA published a proposed plan (preferred alternative) for remediation of the site on July 7, 1988. The remedy published in the proposed plan provides for source control by combining the following components: capping according to RCRA regulations and performance standards set for in RCRA guidance; leachate collection and extraction of groundwater; treatment of leachate and extracted groundwater at a treatment facility; institutional controls; long-term monitoring; and relocation of residents.

During the public comment period several commenters, including the State of Vermont, indicated that EPA's proposed plan for source control did not adequately address lateral groundwater flow through buried waste, or the potential for bedrock groundwater contamination. On August 26, 1988 EPA received a letter from the State of Vermont conveying its concern with the adequacy of the proposed cap to protect groundwater. In subsequent discussions between EPA and the State, the governments agreed that further studies would be appropriate before selecting a final remedial action; however they also agreed that the seep collection and groundwater extraction and treatment portion of the remedy was adequate for the specific limited exposure routes concerned and should be selected as an operable unit. As the relocation was based on the need to move residents while constructing the cap, no decision is being made with respect to relocation options in this Record of Decision.

In the management of migration portion of the proposed plan, EPA stated that the extracted groundwater and leachate would be treated at a facility to be constructed onsite. During the public comment period, EPA received information that the Town of Springfield has the willingness and capacity to treat the extracted groundwater and leachate at their Publicly Owned Treatment Works (POTW) located about one-half mile from the site. It has not been determined however, whether the POTW has the ability, either with or without pretreatment, to treat the wastes. This determination will be made during the remedial design. Since it may be more easily implementable, cost-effective, and have greater community acceptance, use of the POTW is included in the remedy with a provision for on-site treatment if acceptable treatment at the POTW cannot be demonstrated and ensured.

In the proposed plan, EPA specified leachate collection designs. With respect to the leachate collection portion of this remedy, EPA has modified the remedy to allow for alternate designs as long as the alternate design meet the objectives and performance standards outlined. This modification was made to accommodate the potential constructability difficulties that may be encountered due to the steep slopes surrounding the landfill.

VIII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

Prior to the passage of the Superfund Amendments and Reauthorization Act of 1986 (SARA), actions taken in response to releases of hazardous substances were conducted in accordance with CERCLA as enacted in 1980, and the revised National Oil and Hazardous Substance Pollution Contingency Plan (NCP), 40 CFR Part 300, dated November 20, 1985. Until the NCP is revised to reflect SARA, the procedures and standards for responding to releases of hazardous substances, pollutants and contaminants shall be in accordance with Section 121 of CERCLA and to the maximum extent practicable, the current NCP.

Under its legal authorities, EPA's primary responsibility at Superfund sites-is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is granted; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a statutory preference for remedies that permanently and significantly reduce the volume, toxicity or mobility of hazardous wastes over remedies that do not achieve such results through treatment. Response alternatives were developed to be consistent with these Congressional mandates.

A number of potential exposure pathways were analyzed for risk and threats to public health and the environment in the Endangerment Assessment. Guidelines in the Superfund Public Health Evaluation Manual (EPA,1986) regarding development of design goals and risk analyses for remedial alternatives were used to assist EPA in the development of response actions. As a result of these assessments, remedial response objectives were developed to mitigate existing and future threats to public health and the environment. These response objectives are to:

1. Prevent direct contact (incidental ingestion and dermal absorption) with contaminated surface soils throughout the site by residents and by construction workers;
2. Prevent the volatilization of contaminants from contaminated soils, wastes, and leachate seeps;
3. Prevent the contamination of fish in the Black River by preventing leaching of contaminants from site soils to shallow groundwater to the bedrock aquifer with subsequent discharge to Seavers Brook and into the Black River; and
4. Prevent the leaching of contaminants from site soils to shallow groundwater with subsequent transportation from the shallow groundwater to the potable bedrock aquifer.

As discussed above, subsequent to the publication of the proposed plan, the scope to this Record of Decision was limited to an operable unit for seep collection and treatment and limited groundwater extraction and treatment. Therefore, the remedial objectives addressed by this ROD include only the those associated with the groundwater emanating from leachate seeps; these include objectives 1, and to a limited extent 2, 3, and 4.

B. Technology and Alternative Development and Screening

CERCLA, the NCP, and EPA guidance documents, including "Guidance on Feasibility Studies Under CERCLA" dated June 1985, and the "Interim Guidance on Superfund Selection of Remedy'[EPA Office of Solid Waste and Emergency Response (OSWER), Directive No. 9355.0-19 (December 24, 1986) set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements and guidance documents, treatment alternatives were developed for the site ranging from an alternative that, to the degree possible, would eliminate the need for long-term management (including monitoring) at the site, to alternatives involving treatment that would reduce the mobility, toxicity, or volume of hazardous substance as their principal element. In addition to the range of treatment alternatives, a containment option involving little or no treatment and a no-action alternative were developed in accordance with Section 121 of CERCLA.

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. In addition to these factors and the other statutory directives of Section 121, the evaluation and selection process was guided by EPA document "Additional Interim Guidance for FY'87 Records of Decision " dated July 24, 1987. This document provides direction for consideration of SARA cleanup standards and sets forth nine criteria that EPA should consider in its evaluation and selection of remedial actions. The nine criteria are:

1. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).
2. Long-term Effectiveness and Permanence.
3. Reduction of Toxicity, Mobility or Volume.
4. Short-term Effectiveness.
5. Implementability.
6. Community Acceptance.
7. State Acceptance.
8. Cost.
9. Overall Protection of Human Health and the Environment.

Chapter 4 of the Feasibility Study identified, assessed and screened technologies based on implementability and effectiveness. These technologies were combined into source control (SC), management of migration (MM) and Resident Relocation (RR) alternatives. Chapter Five in the Feasibility Study presented the remedial alternatives developed by combining the technologies identified in the previous screening process in the categories required by OSWER Directive No. 9355.0-19. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Each alternative was then evaluated and screened in Chapter 6 of the Feasibility Study on the basis of effectiveness, implementability and cost. In summary, of the seven source control, six management of migration, and three resident relocation remedial alternatives screened in Chapter 6, five source control, two management of migration and three resident relocation options were retained. As noted above, this ROD addresses only the leachate seeps and to a limited extent, groundwater contamination; source control and resident relocation alternatives will be addressed in a subsequent ROD or RODs; therefore, Attachment 4 identifies only the management of migration alternatives that were retained through the screening process as well as those that were eliminated from further consideration.

IX. DESCRIPTION /SUMMARY OF THE DETAILED AND COMPARATIVE ANALYSIS OF ALTERNATIVES

This section presents a narrative summary and brief evaluation of each alternative according to the evaluation criteria described above. A detailed tabular assessment of each alternative can be found in Chapter 7 of the Feasibility Study at Tables 7-28 and 7-34.

Management of Migration (MM) Alternatives Analyzed

Management of Migration alternatives address, in part, contaminants that have migrated from the original source of contamination. At the Old Springfield Landfill site, some contaminants have migrated from the source area into groundwater and emanated as leachate seeps on the east and west side of the landfill. The management of migration alternatives evaluated for the site include a minimal no action with monitoring alternative and a continuous leachate and groundwater extraction followed by treatment alternative.

MM-1
Management of Migration Alternative 1
No Action with Monitoring Alternative

Estimated Present Worth Cost: $1,628,000.
Annual Operation and Maintenance Cost: $86,000.

The law requires consideration of this alternative as a baseline comparison to other management of migration alternatives considered. No action for groundwater would consist of installing fences around leachate seeps, eliminating the use of septic systems for on-site residents and instituting a long-term sampling program to assess the movement of contamination from the landfill.

This alternative does not provide adequate protection of human health and the environment in either the long or short-term, because contaminated leachate would continue to seep from the eastern and western slope, volatilize and flow to surface water in an uncontrolled manner. It does not reduce the toxicity, mobility or volume of contaminants. This alternative does not meet any of the remedial objectives relating to migration of contaminants such as reducing direct contact with leachate, eliminating volatilization of contaminants to the air from seeps, or eliminating the migration of contaminants to the Black River and bedrock aquifer. Also, this alternative does not meet ARARS.

MM-5
Management of Migration Alternative 5
Continuous Collection of Leachate Seeps with Groundwater Extraction and On-site Treatment

Estimated Present Worth Cost: $5,374,000
Annual Operation and Maintenance Cost: $173,000.

This alternative would involve construction of an underground collection system to collect all contaminated seeps from the eastern and western slopes descending from the site; the installation of wells on the western side of the site near Will Dean Road to extract contaminated groundwater for treatment; and the treatment of the collected leachate and extracted groundwater onsite.

This alternative will be protective of human health and the environment by eliminating the pathway for contaminants to volatilize at the seeps by collecting the seeps underground before contact with the air. It will also reduce the potential for contaminants to travel into the Black River and Seavers Brook via surface drainage, thus reducing the possible contamination of fish in those rivers. It will reduce the mobility of contaminants by collecting the seeps and treating them before they can discharge to surface water or leach further into the groundwater. This alternative will attain ARARs.

X. THE SELECTED REMEDY

The selected remedy addresses management of migration technologies to obtain an operable unit for remediation of groundwater emanating from the seeps and known areas of groundwater contamination. The remedy provides for the following components: leachate collection and extraction of groundwater; treatment of leachate and extracted groundwater; institutional controls; long-term monitoring; and additional studies. This remedy does not address the source of groundwater or air contamination.

A. Description of the Selected Remedy

The selected remedy consists of a five pronged remedial action that includes: 1) leachate collection and groundwater extraction (Management *of Migration* Alternative 5); 2) treatment of the leachate and groundwater; 3) institutional controls; 4) monitoring; and 5) additional studies.

1. Leachate Collection/Groundwater Extraction System

The method for collection of leachate will be an underground system which collects the groundwater at or upgradient of the points of seep emanation. The collection system will collect all ten of the detected seeps on the eastern slope and all four of the detected seeps on the western slope with provisions to collect any other seep should it develop.

In addition to leachate collection, groundwater will be extracted from the sand and gravel zone on the western portion of the site. The collected groundwater and leachate would be conveyed to a waste water treatment facility.

Detailed design criteria will be developed during remedial design for best design and construction techniques for the leachate collection system and the best placement and number of extraction wells.

Underground leachate collection and groundwater extraction are the most effective means of capturing contaminated groundwater after it has migrated away from the source area. The system will allow for the addition of other seeps should there be additional breakouts during the duration of the remedy. Underground collection of leachate will eliminate the pathway for contaminants to volatilize at the seeps by collecting the seeps underground before contact with the air. Leachate collection will also reduce the potential for contaminants to travel into the Black River and Seavers Brook via surface drainage, thus reducing possible contamination of fish in those rivers. A non-continuous underground leachate collection system may be appropriate if it can be demonstrated during design to fulfill the following system objectives:

- collect groundwater on the eastern and western slopes which emanates from the landfill as leachate seeps in order to eliminate the contamination and potential contamination in uncontaminated seeps, migrating to Seavers Brook and the Black River and into the bedrock aquifer;
- extract groundwater on the western side of the site in the permeable sand and gravel unit;
- eliminate the volatilization and direct contact risk associated with the leachate seeps; and
- have collection and extraction systems in place which could be extended should new locations of contaminated leachate or practically extractable and contaminated groundwater be located.

The extracted groundwater and collected leachate would be treated at the POTW or onsite as described below.

EPA cannot at this time predict when the leachate collection and groundwater extraction system will fully accomplish its objectives until additional field work and design and implementation of the remedial action are accomplished. An estimate of the time that the system will be in operation will be made after implementation of the source control remedy. A monitoring program will be necessary to determine whether the goals of the system have been achieved. This data may also be used as the basis for modification of the system or the time of its operation, or other appropriate action.

Should additional points or area of groundwater extraction or leachate collection be identified in the future, the system will be expanded to include collection and treatment of these waters if such actions are determined by EPA to be practical and consistent with the leachate collection and groundwater extraction system stated above.

2. Treatment of Groundwater and Leachate

The treatment system for the collected leachate and extracted groundwater will treat the collected leachate and extracted groundwater to meet all federal and state requirements. Treatment will be on-site. However, should the Publicly Owned Treatment Works (POTW) have the ability, capacity, and willingness to treat the extracted groundwater and leachate and meet all federal and state requirements, the collected leachate and extracted groundwater will be piped to the POTW and treated. If the collected groundwater and leachate is directed to the POTW, it will be pretreated if pretreatment is necessary to meet applicable standards, attain surface water quality goals and maintain effective POTW operations. If a demonstration of ability, capacity and willingness is not made, the treatment system will remain onsite.

The Town of Springfield has demonstrated the willingness and capacity to treat the collected leachate and extracted groundwater at the POTW, and has had a review of the system to evaluate if the system has the ability to handle the wastes. This initial evaluation indicates that the POTW may have the ability to treat the wastes. Samples of the collected leachate and extracted groundwater will be bench scale tested during design to ensure effectiveness.

The objective of treatment is to treat the contaminants to levels that would allow them to be discharged to surface water under the Clean Water Act.

3. Institutional Controls

The selected remedy includes restricting the use of groundwater where it may exceed Maximum Contaminant Levels (MCLs). EPA recommends to the State and Town of Springfield that they implement and enforce ordinance 88-2 passed by the Town of Springfield as an institutional control. Specifically, EPA recommends a prohibition on groundwater use in the area bounded by Route 11 on the east, Mr. Curtin's present property boundary on the south, Seavers Brook Road on the west and Mr. Curtin's present property boundary on the north until a time when groundwater levels reach MCLs. The ordinance is attached as Exhibit 1.

4. Monitoring

Monitoring of environmental media will be conducted for thirty (30) years to monitor effectiveness of the remedy and to identify any further impacts to human health and the environment. The objectives of monitoring are:

- to monitor the effectiveness of this and subsequent remedies;
- to continue to monitor the bedrock aquifer to evaluate the possibility that there are new or existing contaminated bedrock flows, discharge points, or

residential wells which have not been detected with current monitoring data;

- to identify further impacts to public health and the environment; and
- to monitor groundwater changes due to the implementation of this and subsequent remedial actions.

The monitoring program will address groundwater, surface water, sediment, soil/debris leachate and air and will include but not be limited to:

- installing and monitoring of new bedrock wells, including locations east of the Black River, to be determined by fracture trace analysis, remote geophysical methods, or other techniques;
- monitoring of residential wells;
- inspecting for and monitoring of any new seeps;
- monitoring of the collected untreated and treated leachate and groundwater;
- monitoring of surface water;
- assessing groundwater for the presence of chemical mixtures should more than one chemical be detected; and
- developing of a statistical test to determine when groundwater and leachate attains the target cleaning levels described below.

The condition and usefulness of existing wells will be checked and compared with future data needs. This comprehensive monitoring well network will be designed to provide sufficient information to evaluate dispersion of the contaminant plume, and the distribution, of contaminant migration off-site.

Monitoring wells will be sampled and analyzed on a quarterly basis until completion of the final remedial action to improve the existing database. After completion of the final remedial action it is anticipated that, monitoring wells will be sampled and analyzed on a quarterly basis for the first three years. Samples in years 4 and 5 are anticipated to be done semi-annually. Samples in years 5 through 10 are anticipated to be collected once per year. After year 10 well sampling are anticipated to be conducted every other year. The useful life of the leachate collection system should exceed thirty years.

Initially, all samples will be analyzed for HSL VOCs, SVOCs PCBs, and metals. Specific parameters may be added or deleted depending on sampling results and observed trends. The duration of monitoring activities will also be assessed after major portions of the remedy have been implemented and periodically thereafter.

Additionally, as required by CERCLA at sites where any hazardous substance, pollutants or contaminants remaining after completion of the remedy, a review of the site will occur every five (5) years. Evaluation of the need for monitoring plan modification will be included in the scope of the five (5) year review.

5. Additional Studies

Additional studies will be conducted to determine the feasibility of isolating waste materials from groundwater through diverting groundwater flow around waste materials, creating physical barriers to separate waste materials from groundwater, landfilling of waste materials in a Hazardous and Solid Waste Amendments (HSWA) landfill, or other appropriate technologies. The additional studies will include but not be limited to:

1) and evaluation of the feasibility, effectiveness, and cost of isolating wastes from groundwater, including a detailed evaluation of:

   a. an upgradient, permeable vertical groundwater diversion structure similar in function to a french drain;

   b. physical barriers, such as a slurry wall, that separate waste material from groundwater and/or depress the water table to minimize contact between waste and groundwater;

   c. a means of lowering the water table in areas of waste disposal to eliminate or minimize contact between waste and groundwater;

   d. removing the waste, including that waste in contact with groundwater, for disposal in a HSWA landfill;

   e. removing the waste, including that waste in contact with groundwater, for treatment by incineration or vitrification;

f. other means of isolating waste materials from groundwater; and

g. combinations of the above.

2) a quantitative determination of the amount of infiltration and flow contacting buried waste from vertical infiltration and lateral groundwater flow. For each of the evaluations conducted in 1) above, quantitatively compare the amounts of infiltration and groundwater flow contacting waste through vertical infiltration and lateral groundwater flow before and after remedy implementation; and

3) an identification and characterization of outlying areas of potential contamination which may have escaped detection in earlier investigatory work including the western slope area between Seavers Brook Road and Will Dean Road and an area on the southwestern portion of the site near Will Dean Road, as indicated by the magnetic anomaly in Figure 3-3 of the Supplemental Remedial Investigation, to determine if there are additional source of contamination. If additional contamination is found, it will be remediated as part of the source control operable unit, or taken offsite for disposal in accordance with EPA's offsite policy.

B. Estimated Remedial Schedule

Record of Decision	September 1988
Negotiations with PRPs	December 1988-March 1989
Remedial Design	May 1989-November 1990
Construction	December 1990-December 1992
Complete Remedial Action Construction	January 1993

C. Rationale for Selection/Points of Compliance

The rationale for choosing the selected alternative is based on the assessment of each criteria listed in the evaluation of alternatives section of this document. In accordance with Section 121 of CERCLA, to be considered as a candidate for selection in the ROD, the alternative must have been found to be protective of human health and the environment and able to attain ARARs unless a waiver is granted. Therefore, in choosing among alternatives, the difference in the remaining criteria, namely short term effectiveness, long term effectiveness, implementability, use of treatment to permanently reduce the mobility, toxicity and volume, and the cost were the focus of the evaluation, while the nontechnical factors that affect the implementability of a remedy, such as state and community acceptance, also were considered.

Based upon this assessment, taking into account the statutory preferences of CERCLA, EPA selected the remedial approach for the site.

1. Leachate Collection/Groundwater Extraction

The objective of the leachate collection and groundwater extraction system is to collect contaminated groundwater as close the site boundary as practicable, and prevent the exposures to chemicals in groundwater discharging in seeps as soon as is practically possible. The objective of underground leachate collection is to eliminate the volatilization of leachate contaminates. To meet this objective in a manner consistent with the nine selection criteria, two areas of leachate collection (east slope and west slope) and one area of groundwater extraction have been identified and are described below.

Underground leachate collection and groundwater extraction are the most effective means of capturing contaminated groundwater. The system will allow for the addition of other seeps should there be additional breakouts during the duration of the remedy. Underground collection of leachate will eliminate the pathway for contaminants to volatilize at the seeps by collecting the seeps underground before contact with the air. It will also reduce the potential for contaminants to travel into the Black River and Seavers Brook via surface drainage thus reducing the possible contamination of fish in those surface waters.

Groundwater extraction wells in the sand and gravel unit above the bedrock on the western side of the site near Will Dean Road is a most effective means of capturing contaminated groundwater as close to the site boundary as possible. The groundwater extraction portion of the management of migration remedy will likely reduce the time required to meet the groundwater target cleanup levels.

Groundwater and Leachate Target Cleanup Levels

The evaluation of groundwater target cleanup levels focused on the type of groundwater contamination at the site, the groundwater use, the levels necessary to protect public health and the environment and the time required to achieve remediation goals. The Superfund Public Health Evaluation Manual and EPA's Groundwater Protection Strategy aided in the development of groundwater remediation target levels. The groundwater's current and potential uses and the levels necessary to protect human health and the environment. influences groundwater cleanup levels and the time of restoration.

Based on the contaminants found in groundwater during the Remedial Investigation, and discussions in the ARARs section, the following contaminants and their respective MCLs were identified as appropriate groundwater cleanup levels at the extraction wells and at the point where leachate emanates at the seeps.

Contaminants	Clean up Levels	Incremental Lifetime Cancer Risk
Benzene	5 ppb	4×10^{-6}
1,1-dichloroethene	7 ppb	3×10^{-5}
Trichloroethene	5 ppb	2×10^{-6}
Vinyl Chloride	2 ppb	1×10^{-4}

The preceding compounds were selected because they were compounds which were documented to exceed their respective MCLs at the leachate seep and in the western sand and gravel zone. Lifetime exposure to these four contaminants individually will result in lifetime cancer risk levels ranging from 10^{-4} to 2×10^{-6} which is within the risk range of 10^{-4} to 10^{-7} for Superfund remedies. The groundwater should also be assessed for the presence of chemical mixtures should more than one chemical be detected. Thus, in addition to attaining ARARs, the cleanup levels will be protective of human health and the environment.

2. Treatment of Leachate and Groundwater

The use of the Town of Springfield's POTW may be the cost-effective method to treat collected leachate and extracted groundwater from the site. As noted above, this is the rationale to be used in determining whether treatment will be on site or at the POTW. The POTW is designed to treat 2 millon gallons of waste water per day and the current average flow is 1 million gallons per day.

Although not required by the State at this time, if required at some future point, pretreatment will be easily implementable. The Town of Springfield has indicated its willingness to place the pretreatment unit on property presently owned by the Town adjacent to the treatment plant. The Town's letter is attached as Exhibit 2.

3. Institutional Controls

The selected remedy includes restricting the use of groundwater where it may exceed Maximum Contaminant Levels (MCLs). EPA recommends to the State and Town of Springfield that they implement and enforce ordinance 88-2 passed by the Town of Springfield as an institutional control. Specifically, EPA recommends a prohibition on groundwater use in the area bounded by Route 11 on the east, Mr. Curtin's present property boundary on the south, Seavers Brook Road on the west and Mr. Curtin's present property boundary on the north until a time when groundwater levels reach MCLs. The ordinance is attached as Exhibit 1.

4. Monitoring

The monitoring program will be designed to meet the RCRA groundwater monitoring requirements and site specific objectives will be tailored to site specific hydrogeologic conditions. Wells will be sampled on a periodic basis as previously described to evaluate dispersion of the contaminant plume, the effectiveness of the remedy, and evaluate attainment of groundwater cleanup goals and monitor contaminant concentration in groundwater.

5. Additional Studies

Additional studies will be conducted to determine the feasibility of isolating waste materials from groundwater. As noted above the need to isolate groundwater was conveyed to EPA by commenters during the public comment period and by the State of Vermont on September 2, 1988. The diverting of groundwater flow from waste materials, creating physical barriers separating waste materials from groundwater, landfilling of waste materials in a Hazardous and Solid Waste Amendments (HSWA) landfill, or other appropriate technologies will be studied in order to determine if such diversion would decrease the time needed to attain groundwater cleanup levels and eliminate the risks associated with the contamination of bedrock.

Also included will be an investigation of the western slope area between Seavers Brook Road and Will Dean Road and a magnetic anomaly near Will Dean Road, to determine if it is an additional source of contamination. The western slope area is a location where the type and quantity of contamination needs further characterization. Debris and a number of metal 55 gallon drums have been observed in the area. What this appears to be the result of limited incidental dumping over the slope from Pine Ridge Road or Will Dean Road. This area may be an additional source of contamination of the western seeps or represents a direct contact, volatilization threat or both. Therefore samples will be collected in the western slope area.

XI. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Old Springfield Landfill site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment and attains ARARS. The selected remedy also offers the best combination of effectiveness, implementability, and cost in comparison with the other alternatives that provide the same level of protection.

A. The Selected Remedy is Protective of Human Health and the Environment

The remedy at this site will reduce the risks presently posed to human health and the environment by the leachate seeps and to a limited extent groundwater contamination. Significant public health and environmental benefits are provided by leachate collection and groundwater extraction. Leachate collection and groundwater extraction will prevent inhalation, ingestion and direct contact exposures from chemicals migrating from the site. Underground collection of groundwater will eliminate the volatilization of contaminants from the leachate seeps, prevent the spread of contaminants via surface water flow to the Black River and Seavers Brook with subsequent contamination of fish.

B. The Selected Remedy Attains ARARs

This remedy will meet or attain all applicable or relevant and appropriate federal and state requirements that apply to this operable unit at the site. Environmental laws which are applicable or relevant and appropriate to this operable unit remedial action at the Old Springfield Landfill site are:

Resource Conservation and Recovery Act (RCRA)
National Pollution Discharge Elimination System (NPDES)
Safe Drinking Water Act (SDWA)

A brief harrative summary of the ARARs follows.

Monitoring of environmental media for 30 years will comply at a minimum with RCRA groundwater monitoring requirements under 40 CFR Part 264, Subpart F.

If the collected leachate and extracted groundwater is treated onsite, the National Pollution Discharge Elimination System (NPDES) requires that the discharge of water into public surface waters must meet NPDES permitting requirements. The water treatment system would be designed, constructed and operated to insure that all discharge effluent are in compliance the NPDES requirements.

The Proposed Standards for Control of Emissions of Volatile Organics (52 FR 3748, February 5, 1987) proposes standards for VOC air emissions from units such as air strippers. Air strippers may be part of the treatment system. This proposed standard would require air treatment equipment to be designed, constructed, and operated in tandem with air stripping units.

If the collected leachate and extracted groundwater is conveyed to the Town of Springfield POTW for treatment, the Domestic Sewage Exclusion (40 CFR Section 261.4(a)(1)) provides that a hazardous waste, when mixed with domestic sewage, is no longer considered a solid waste. Therefore, hazardous waste may be mixed with domestic sewage and sent to the POTW which does not have a RCRA treatment, storage and disposal facility permit.

The POTW is required to have an NPDES permit to discharge to the Black River, and has a history of compliance with its NPDES permit.

In addition, drinking water standards established under the Safe Drinking Water Act (SDWA) are used to set cleanup levels for groundwater outside the area of institutional controls. This area may be used as a drinking water source, therefore MCLs established under the SDWA are relevant and appropriate and will be attained.

C. The Selected Remedial Action is Cost Effective

Once EPA has identified alternatives that are protective and attain ARARs, unless a waiver is granted, EPA analyzes those alternatives to determine a cost-effective means of achieving the cleanup.

Each of the alternatives underwent a detailed cost analysis to develop costs to the estimate accuracy of -30 to +50 percent. In that analysis, capital and operation and maintenance costs were estimated and then used to develop present worth costs. In the present worth analysis, annual costs were calculated for thirty years (estimated life of an alternative) using a five (5) percent interest rate factor and were based on 1988 costs.

The preferred remedy is cost-effective. The alternative estimated to cost less than the preferred remedy are less protective and do

not meet the remedial objectives and ARARs. The no action alternative provides little protection and does not meet ARARs.

D. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

This operable unit remedy utilizes permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable for this site. Treatment of the collected leachate and extracted groundwater will permanently and significantly reduce the volume, toxicity and mobility of the contaminants. The pumping wells in the sand and gravel unit provide a further reduction in mobility by reducing the amount of contaminants leaching to bedrock and Seavers Brook. Collection of the seeps before they reach the surface reduces the air toxicity. However, EPA will require that institutional controls restricting groundwater use be implemented.

E. The Selected Remedy Satisfies the Preference for Treatment as a Principal Element

The principal element of the selected remedy is the collection and treatment of leachate and groundwater. This addresses the primary threat for this operable unit. Treatment of leachate and contaminated groundwater satisfies the statutory preference for treatment.

XII. STATE ROLE

The Vermont Department of Environmental Conservation has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also reviewed the Remedial Investigation, Supplemental Remedial Investigation, Endangerment Assessment, and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental laws and regulations. The State of Vermont concurs with the selected remedy for the Old Springfield Landfill site. A copy of the declaration of concurrence is attached as Appendix 1. In accordance with Section 104 of CERCLA, the State of Vermont is responsible for at least 50 percent of the cost of the remedial action and all operation and maintenance.

ATTACHMENT 1

GROUND WATER MONITORING WELL
ORGANIC [illegible]LTS
(EAST SIDE)

OLD SPRINGFIELD LANDFILL SITE

MONITORING WELL ORGANIC DATA: EAST SIDE.

SOURCE	MW1	DUPLICATE	MW1	MW1	MW2	MW2	MW-2	MW3	MW3	MW4	MW4	MW4	MW4	MW10	MW10
SAMPLE			BW-001-001	BW-001-002		BW-002-001	BW-002-002		BW-003-001		BW-004-001	BW-004-002	BW-004-003		BW-010-001
TRAFFIC NO.	12134	12137	AH 151	AI 587	12138	AH 152	AI 532	12139	AH 153	12140	AH 154	AI 533	AI 588	12148	AH 150
SAMPLING DATE	1/30/85	1/30/85	9/27/86	4/13/88	1/30/85	9/27/86	9/24/87	1/30/85	9/30/86	1/30/85	9/27/86	9/23/87	4/12/88	1/30/85	9/30/86
UNIT	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
COMPOUND															
—CHLORINATED ALIPHATIC HYDROCARBONS															
V VINYL CHLORIDE						150.0	88.0								
V METHYLENE CHLORIDE															
V 1,1-DICHLOROETHENE									3.0						
V 1,1-DICHLOROETHANE							2.2		7.0						
V TRANS-1,2-DICHLOROETHENE					1100.0	160.0	120.0		6.0						
V 1,2-DICHLOROETHANE															
V 1,1,1-TRICHLOROETHANE							2.1		5.0						
V TRICHLOROETHENE						52.0	68.0	41.0	110.0						
V 1,1,2-TRICHLOROETHANE															
V TETRACHLOROETHENE							1.7		5.0		1.0				
—MONOCYCLIC AROMATIC HYDROCARBONS															
V BENZENE			7.0		1700.0										
V TOLUENE	6.0	6.0		2.0	10000.0	580.0	5.2						1.0		
V CHLOROBENZENE	42.0	42.0	42.0	30.0											
V ETHYLBENZENE	140.0	130.0	83.0	240.0	2400.0	140.0									
V TOTAL XYLENES	240.0	210.0	130.0	330.0	12000.0	1600.0									
— KETONES															
V ACETONE															
V 2-BUTANONE															
V 4-METHYL-2-PENTANONE					1700.0			50.0							
—MISCELLANEOUS VOLATILE ORGANICS															
V CHLOROFORM															
— PHTHALATE ESTERS															
B DIETHYLPHTHALATE			3.0	23.0											
B DI-N-BUTYLPHTHALATE			4.0								3.0				
B BIS(2-ETHYLHEXYL)PHTHALATE			9.0	20.0		610.0	11.0		4.0				27.0		
—POLYCYCLIC AROMATIC HYDROCARBONS															
B PHENANTHRENE						51.0									
B PYRENE															
B NAPHTHALENE	21.0	18.0	16.0	20.0	100.0	240.0	7.2								
—MISCELLANEOUS NON-VOLATILE ORGANICS															
B N-NITROSODIPHENYLAMINE			5.0	4.0											
B 1,4-DICHLOROBENZENE	10.0		7.0	6.0											
B 1,2-DICHLOROBENZENE			2.0				10.0								
B 2-NITROPHENOL															
B 4-CHLORO-3-METHYLPHENOL			87.0	86.0											
B 2,4-DIMETHYLPHENOL				8.0											
B 2-METHYLNAPHTHALENE	38.0	27.0	6.0	6.0	53.0	240.0	10.0								
B 3-NITROANILINE						200.0									
— PCBS															
P AROCLOR-1242	1.2	1.4													
P AROCLOR-1254	1.6	1.7													
P AROCLOR-1260	1.1	1.0				0.5									

GROUND WATER MONITORING WELL RESULTS
(WEST SIDE)
OLD SPRINGFIELD LANDFILL SITE

MONITORING WELL ORGANIC DATA: WEST SIDE.

SOURCE	MW5	MW5	MW50	MW50	MW50	MW6	MW6	MW6	MW7	MW7	MW7	MW8	MW8	MW9	MW9
SAMPLE	BW-005-001	BW-005-002		BW-005-001D	BW-005-002D		BW-006-001	BW-006-002		BW-007-001	BW-007-002		BW-008-001		BW-009-001
TRAFFIC NO.	AH 133	AI 534	12142	AH 162	AI 535	12143	AH 136	AI 536	12144	AH 137	AI 537	12145	AH 138	12146	AH 139
SAMPLING DATE	9/25/86	9/22/87	1/30/85	9/25/86	9/22/87	1/30/85	9/25/86	9/22/87	1/30/85	9/26/86	9/22/87	1/30/85	9/27/86	1/30/85	9/26/86
UNIT	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
COMPOUND															
—CHLORINATED ALIPHATIC HYDROCARBONS															
V VINYL CHLORIDE															
V 1,1-DICHLOROETHENE															6.0
V 1,1-DICHLOROETHANE															2.0
V TRANS-1,2-DICHLOROETHENE													8.0	42.0	29.0
V 1,1,1-TRICHLOROETHANE														19.0	24.0
V TRICHLOROETHENE														99.0	130.0
V TETRACHLOROETHENE															1.0
—MONOCYCLIC AROMATIC HYDROCARBONS															
V BENZENE															
V TOLUENE								1.0			1.1				
V CHLOROBENZENE															
V ETHYLBENZENE															
V TOTAL XYLENES															
—MISCELLANEOUS VOLATILE ORGANICS															
V CHLOROFORM															
V 2-BUTANONE															
— PHTHALATE ESTERS															
B BIS(2-ETHYLHEXYL)PHTHALATE										16.0	2.2		3.0		
B ISOPHORONE															

MONITORING WELL ORGANIC DATA: WEST SIDE.

SOURCE	MW9D	MW9D	MW9D	MW9D	MW11	DUPLICATE	MW11	MW-11	MW-11	MW-12D	MW-12	MW-13D	MW15	MW15	MW15D
SAMPLE		GW-009-001D	GW-009-2D	GW-009-03D			GW-011-001	GW-011-002	GW-011-003	GW-012-001D	GW-012-001	GW-013-001D	GW-015-001	GW-015-002	GW-015-001D
TRAFFIC NO.	12147	AH 163	AI 538	AI 589	12149	12150	AH161	AI 500	AI 590	AI 540	AI 539	AI 541	AI 544	AI 591	AI 545
SAMPLING DATE	* 1/30/05	9/25/06	9/24/07	4/12/08	1/30/05	1/30/05	9/26/06	9/24/07	4/12/08	9/23/07	9/24/07	9/23/07	9/22/07	4/12/08	9/22/07
UNIT	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
COMPOUND															
—CHLORINATED ALIPHATIC HYDROCARBONS															
V VINYL CHLORIDE	20.0		12.0	19.0											110.0
V 1,1-DICHLOROETHENE		4.0	3.5	3.0											1.9
V 1,1-DICHLOROETHANE	8.0	4.0	4.9	4.0											2.3
V TRANS-1,2-DICHLOROETHENE	120.0	64.0	35.0	35.0											25.0
V 1,1,1-TRICHLOROETHANE	9.0	27.0	16.0	22.0											1.0
V TRICHLOROETHENE	68.0	160.0	98.0	130.0									1.2		23.0
V TETRACHLOROETHENE		1.0	1.0	1.0											
—MONOCYCLIC AROMATIC HYDROCARBONS															
V BENZENE															2.3
V TOLUENE			1.5					1.4	1.0	1.9				1.0	4.7
V CHLOROBENZENE															2.9
V ETHYLBENZENE															
V TOTAL XYLENES	10.0														3.4
—MISCELLANEOUS VOLATILE ORGANICS															
V CHLOROFORM											1.1	5.3			
V 2-BUTANONE															
— PHTHALATE ESTERS															
B BIS(2-ETHYLHEXYL)PHTHALATE				2.0					5.0					2.0	
B ISOPHORONE														3.0	

LEACHATE SEEP/SPRING ORGANIC RESULTS
(WEST SIDE)
OLD SPRINGFIELD LANDFILL SITE

LEACHATE SEEP/SPRING ORGANIC DATA, WEST SIDE.

	SOURCE	LSW-1	LSW-2	LSW-2	LSW-4	LSW-4	LSW-4	LSW-4	LSW-4						
	SAMPLE	LS-007-001	LS-002-001	LS-04-1	LS-001-002	LS-001-001	LS-003-2	LS-03	LS-001-003	LS-07-1	LS-09-1	LS-11-1			
	TRAFFIC NO.	AI 521	AH 179	A0401	AI 318	AH 178	AF600	12153	AI 600	A0478	A0484	A0482			
	SAMPLING DATE	9/23/87	9/30/86	12/85	9/23/87	9/30/86	12/85	1/85	4/13/88	12/85	12/85	12/85	FREQUENCY OF DETECTION	MINIMUM DETECTED VALUE	MAXIMUM DETECTED VALUE
CLASS	COMPOUND UNIT	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l			
–	CHLORINATED ALIPHATIC HYDROCARBONS														
V	VINYL CHLORIDE		2.0		97.0	53.0	140.0	93.0	38.0		51.0		7	2.0	140.0
V	1,1-DICHLOROETHENE				5.7	29.0					34.0		3	5.7	34.0
V	1,1-DICHLOROETHANE				10.0	4.0	2.6		2.0				4	2.0	10.0
V	TRANS-1,2-DICHLOROETHENE		8.0	8.6	38.0	210.0	8.6	12.0	1.0				7	1.0	210.0
V	1,1,1-TRICHLOROETHANE		7.0	3.2	17.0	140.0	12.0	10.0	1.0		160.0		8	1.0	160.0
V	TRICHLOROETHENE		40.0	19.0	75.0	530.0	3.2	6.0			1000.0		7	3.2	1000.0
V	TETRACHLOROETHENE					9.0					10.0		2	9.0	10.0
–	MONOCYCLIC AROMATIC HYDROCARBONS														
V	BENZENE				2.1		2.0	2.0					3	2.0	2.1
V	TOLUENE				1.6		4.0						2	1.6	4.0
V	CHLOROBENZENE				2.3		2.2		3.0				3	2.2	3.0
V	ETHYLBENZENE				2.4		3.1		2.0				3	2.0	3.1
V	TOTAL XYLENES				2.3		6.1						2	2.3	6.1

ATTACHMENT 2

SOIL ORGANIC DATA-COMPOUND FREQUENCY DISTRIBUTION FROM SURFACE TO 4.5 FOOT INTERVAL.

CLASS	COMPOUND	FREQUENCY OF DETECTION	MINIMUM DETECTED VALUE	MAXIMUM DETECTED VALUE
	——MONOCYCLIC AROMATIC HYDROCARBONS			
V	BENZENE	5	2	5600
V	CHLOROBENZENE	1	1700	1700
V	ETHYLBENZENE	3	2	2600
V	TOLUENE	17	2	3300
V	XYLENES (TOTAL)	7	9	4200
	——CHLORINATED ALIPHATIC HYDROCARBONS			
V	METHYLENE CHLORIDE	1	7500	7500
V	TETRACHLOROETHENE	2	50	51
V	TRANS-1,2-DICHLOROETHENE	1	140	140
V	1,1,1-TRICHLOROETHANE	2	5	1800
V	TRICHLOROETHENE	6	14	5600
V	TRANS-1,3-DICHLOROPROPENE	1	5000	5000
	——MISCELANEOUS VOLATILE COMPOUNDS			
V	CHLOROFORM	6	1	360
V	STYRENE	2	11	70
V	2-BUTANONE	0	NA	NA
V	CARBON DISULFIDE	0	NA	NA
	——POLYCYCLIC AROMATIC HYDROCARBONS			
B	ACENAPHTHENE	0	NA	NA
B	ACENAPHTHYLENE	3	32	330
B	ANTHRACENE	5	120	3600
B	BENZO(A)ANTHRACENE	5	250	12000
B	BENZO(A)PYRENE	6	330	10000
B	BENZO(B)FLUORANTHENE	6	330	11000
B	BENZO(k)FLUORANTHENE	2	130	8200
B	BENZO(G,H,I)PERYLENE	2	350	4800
B	CHRYSENE	6	460	12000
B	FLUORANTHENE	10	210	30000
B	FLUORENE	2	51	5000
B	INDENO(1,2,3-CD)PYRENE	2	330	4400
B	NAPHTHALENE	2	4600	5600
B	PHENANTHRENE	9	130	17000
B	PYRENE	10	330	24000
B	DIBENZO(a,h)ANTHRACENE	1	170	170
	——PHTHALATE ESTERS			
B	BIS(2-ETHYLHEXYL)PHTHALATE	4	380	23000
B	BUTYLBENZYLPHTHALATE	2	42	330
B	DIETHYLPHTHALATE	4	14	3700
B	DI-N-BUTYLPHTHALATE	3	330	2700
B	DI-N-OCTYL PHTHALATE	5	330	4700
	——MISCELANEOUS NON-VOLATILE COMPOUNDS			
B	1,2-DICHLOROBENZENE	1	17000	17000
B	N-NITROSODIPHENYLAMINE(1)	1	1000	1000
B	DIBENZOFURAN	1	15	15
B	2-METHYLNAPHTHALENE	3	2300	6000
A	4-METHYLPHENOL	0	NA	NA
A	BENZOIC ACID	0	NA	NA
	——PCBS AND PESTICIDES			
P	BETA-BHC	2	7.7	8.9
P	PCB-1254	6	30	19000
P	PCB-1260	7	40	5286

OLD SPRINGFIELD INORGANIC SOIL DATA-ELEMENT FREQUENCY DISTRIBUTION FROM SURFACE TO 4.5 FOOT INTERVAL.

FREQUENCY OF DETECTION	MINIMUM DETECTED VALUE	MAXIMUM DETECTED VALUE

	FREQUENCY OF DETECTION	MINIMUM DETECTED VALUE	MAXIMUM DETECTED VALUE
ALUMINUM	48	2260	14900
ARSENIC	21	0.5	10
BARIUM	44	9.9	164
BERYLLIUM	14	0.2	0.6
CADMIUM	13	0.06	7.3
CALCIUM	37	403	19227
CHROMIUM	48	2.5	70
COBALT	39	1.3	10
COPPER	48	5	147
IRON	48	4006	27300
LEAD	46	2.8	139
MAGNESIUM	37	807	4980
MANGANESE	48	42	467
MERCURY	10	0.087	0.28
NICKEL	39	4.5	36
POTASSIUM	23	348	2100
SILVER	3	1.8	22
SODIUM	15	104	1470
TIN	3	8.4	33
VANADIUM	44	3.7	41
ZINC	48	13	441
CYANIDE	0	0	0

SOIL ORGANIC DATA-COMPOUND FREQUENCY DISTRIBUTION FROM 4.5 TO 9.5 FOOT INTERVAL.

CLASS	COMPOUND	FREQUENCY OF DETECTION	MINIMUM DETECTED VALUE	MAXIMUM DETECTED VALUE
	MONOCYCLIC AROMATIC HYDROCARBONS			
V	BENZENE	0	NA	NA
V	CHLOROBENZENE	0	NA	NA
V	ETHYLBENZENE	4	1000	3600
V	TOLUENE	4	88	1300
V	XYLENES (TOTAL)	3	5900	24000
	CHLORINATED ALIPHATIC HYDROCARBONS			
V	METHYLENE CHLORIDE	0	NA	NA
V	TETRACHLOROETHENE	2	10	16000
V	TRANS-1,2-DICHLOROETHENE	2	5	15
V	1,1,1-TRICHLOROETHANE	0	NA	NA
V	TRICHLOROETHENE	3	3	26
V	TRANS-1,3-DICHLOROPROPENE	0	NA	NA
	MISCELANEOUS VOLATILE COMPOUNDS			
V	CHLOROFORM	0	NA	NA
V	STYRENE	0	NA	NA
V	2-BUTANONE	0	NA	NA
V	CARBON DISULFIDE	0	NA	NA
	POLYCYCLIC AROMATIC HYDROCARBONS			
B	ACENAPHTHENE	3	24	7700
B	ACENAPHTHYLENE	2	250	12000
B	ANTHRACENE	3	440	35000
B	BENZO(A)ANTHRACENE	2	970	51000
B	BENZO(A)PYRENE	2	1100	40000
B	BENZO(B)FLUORANTHENE	2	1800	32000
B	BENZO(k)FLUORANTHENE	1	30000	30000
B	BENZO(G,H,I)PERYLENE	2	430	28000
B	CHRYSENE	3	210	45000
B	FLUORANTHENE	5	280	130000
B	FLUORENE	3	27	21000
B	INDENO(1,2,3-CD)PYRENE	2	440	23000
B	NAPHTHALENE	4	83	5500
B	PHENANTHRENE	5	68	150000
B	PYRENE	5	500	79000
B	DIBENZO(a,h)ANTHRACENE	1	20000	20000
	PHTHALATE ESTERS			
B	BIS(2-ETHYLHEXYL)PHTHALATE	5	2600	16000
B	BUTYLBENZYLPHTHALATE	1	360	360
B	DIETHYLPHTHALATE	0	NA	NA
B	DI-N-BUTYLPHTHALATE	1	2300	2300
B	DI-N-OCTYL PHTHALATE	0	NA	NA
	MISCELANEOUS NON-VOLATILE COMPOUNDS			
B	1,2-DICHLOROBENZENE	0	NA	NA
B	N-NITROSODIPHENYLAMINE(1)	1	1600	1600
B	DIBENZOFURAN	2	110	16000
B	2-METHYLNAPHTHALENE	3	40	3700
A	4-METHYLPHENOL	0	NA	NA
A	BENZOIC ACID	0	NA	NA
	PCBS AND PESTICIDES			
P	BETA-BHC	0	NA	NA
P	PCB-1254	7	250	42000
P	PCB-1260	1	720	720

OLD SPRINGFIELD INORGANIC SOIL DATA-ELEMENT FREQUENCY DISTRIBUTION FROM 4.5 TO 9.5 FOOT INTERVAL.

FREQUENCY OF DETECTION | MINIMUM DETECTED VALUE | MAXIMUM DETECTED VALUE

	FREQUENCY OF DETECTION	MINIMUM DETECTED VALUE	MAXIMUM DETECTED VALUE
ALUMINUM	36	1190	16000
ARSENIC	22	1.2	15.2
BARIUM	36	6.5	1266
BERYLLIUM	22	0.2	0.9
CADMIUM	8	2.1	7.6
CALCIUM	36	135	49279
CHROMIUM	36	2.6	163
COBALT	33	2.7	12
COPPER	36	5	1997
IRON	36	4100	65000
LEAD	34	3	835
MAGNESIUM	36	566	7535
MANGANESE	36	45	809
MERCURY	5	0.082	0.13
NICKEL	35	5.3	150
POTASSIUM	13	342	2252
SILVER	13	1.5	14.9
SODIUM	4	125	831
THALLIUM	2	0.5	0.57
TIN	3	8	43
VANADIUM	35	4.3	32
ZINC	33	13	1029
CYANIDE	20	0	3.8

SOIL ORGANIC DATA-COMPOUND FREQUENCY DISTRIBUTION BELOW 9.5 FOOT LEVEL.

CLASS	COMPOUND	FREQUENCY OF DETECTION	MINIMUM DETECTED VALUE	MAXIMUM DETECTED VALUE
	MONOCYCLIC AROMATIC HYDROCARBONS			
V	BENZENE	1	1	1
V	CHLOROBENZENE	0	NA	NA
V	ETHYLBENZENE	2	260	23000
V	TOLUENE	5	6	35000
V	XYLENES (TOTAL)	1	110000	110000
	CHLORINATED ALIPHATIC HYDROCARBONS			
V	METHYLENE CHLORIDE	0	NA	NA
V	TETRACHLOROETHENE	4	3	15000
V	TRANS-1,2-DICHLOROETHENE	1	9	9
V	1,1,1-TRICHLOROETHANE	1	1	1
V	TRICHLOROETHENE	2	15	18000
V	TRANS-1,3-DICHLOROPROPENE	0	NA	NA
	MISCELANEOUS VOLATILE COMPOUNDS			
V	CHLOROFORM	2	2	4
V	STYRENE	1	290	290
V	2-BUTANONE	0	NA	NA
V	CARBON DISULFIDE	0	NA	NA
	POLYCYCLIC AROMATIC HYDROCARBONS			
B	ACENAPHTHENE	0	NA	NA
B	ACENAPHTHYLENE	3	16	120
B	ANTHRACENE	2	56	62
B	BENZO(A)ANTHRACENE	0	NA	NA
B	BENZO(A)PYRENE	0	NA	NA
B	BENZO(B)FLUORANTHENE	0	NA	NA
B	BENZO(K)FLUORANTHENE	0	NA	NA
B	BENZO(G,H,I)PERYLENE	1	190	130
B	CHRYSENE	0	NA	NA
B	FLUORANTHENE	2	360	380
B	FLUORENE	1	69	69
B	INDENO(1,2,3-CD)PYRENE	0	NA	NA
B	NAPHTHALENE	0	NA	NA
B	PHENANTHRENE	4	37	230
B	PYRENE	3	300	500
B	DIBENZO(a,h)ANTHRACENE	0	NA	NA
	PHTHALATE ESTERS			
B	BIS(2-ETHYLHEXYL)PHTHALATE	1	27000	27000
B	BUTYLBENZYLPHTHALATE	2	33	1400
B	DIETHYLPHTHALATE	0	NA	NA
B	DI-N-BUTYLPHTHALATE	0	NA	NA
B	DI-N-OCTYL PHTHALATE	1	9	9
	MISCELANEOUS NON-VOLATILE COMPOUNDS			
B	1,2-DICHLOROBENZENE	1	76	76
B	N-NITROSODIPHENYLAMINE(1)	0	NA	NA
B	DIBENZOFURAN	0	NA	NA
B	2-METHYLNAPHTHALENE	3	13	110
A	4-METHYLPHENOL	1	140	140
A	BENZOIC ACID	2	28	58
	PCBS AND PESTICIDES			
P	BETA-BHC	1	11	11
P	PCB-1254	7	55	49000
P	PCB-1260	0	NA	NA

OLD SPRINGFIELD INORGANIC SOIL DATA-ELEMENT FREQUENCY DISTRIBUTION BELOW 9.5 FOOT LEVEL.

FREQUENCY OF DETECTION MINIMUM DETECTED VALUE MAXIMUM DETECTED VALUE

	FREQUENCY OF DETECTION	MINIMUM DETECTED VALUE	MAXIMUM DETECTED VALUE
ALUMINUM	15	1850	9446
ARSENIC	8	1.2	5.4
BARIUM	15	8.7	1100
BERYLLIUM	7	0.2	3.3
CADMIUM	1	3	3
CALCIUM	15	672	12700
CHROMIUM	15	2.6	70
COBALT	15	3.5	43
COPPER	15	7	470
IRON	15	3690	24900
LEAD	14	3.2	302
MAGNESIUM	15	1030	4800
MANGANESE	15	44	494
MERCURY	3	0.17	0.23
NICKEL	14	6.4	41
POTASSIUM	13	529	2490
SILVER	2	1.6	2.4
SODIUM	4	106	3190
THALLIUM	2	0.53	0.63
TIN	1	20	20
VANADIUM	15	4.5	17.4
ZINC	14	22	2330
CYANIDE	3	1.2	5.3

ATTACHMENT 3

SUMMARY OF SELECTION OF CHEMICALS OF POTENTIAL CONCERN
OLD SPRINGFIELD LANDFILL SITE

Chemical	Soil	Monitoring Wells	Leachate Seeps	Leachate Sediments
Chlorinated Aliphatics				
Vinyl Chloride		X	X	X
Methylene chloride	X(b)	X		
1,1-Dichloroethene		X	X	X
1,1-Dichloroethane		X	X	X
trans-1,2-Dichloroethene	X(a)	X	X	
1,1,1-Trichloroethane	X	X		
Trichloroethene	X	X	X	X
Tetrachloroethene	X(b)	X	X	X
Chloroform	X	X		X
Monocyclic Aromatics				
Benzene	X	X	X	X
Toluene	X	X	X	X
Chlorobenzene	X(a)	X	X	
1,2-Dichlorobenzene	X(a)	X	X	
Ethylbenzene		X	X	X
Xylenes	X	X	X	X
Other Volatiles				
Acetone		X	X	X
Semi-Volatiles				
Diethyl Phthalate		X		
Bis(2-ethylhexyl)phthalate	X	X	X	X
Naphthalene	X(b)	X	X	
Di-n-butylphthalate		X		
Carcinogenic PAHs[c]	X			X
PCBS	X	X		X
Inorganics				
Cadmium	X			
Mercury	X(b)			
Copper		X	X	
Nickel		X	X	

ATTACHMENT 4

SUMMARY OF INITIAL SCREENING OF REMEDIAL ALTERNATIVES
OLD SPRINGFIELD LANDFILL SITE
FEASIBILITY STUDY REPORT

Alternative	Retained for Further Evaluation	Eliminated from Further Evaluation
Management of Migration Alternatives		
MM-1 Minimal No-Action	X	
MM-2 Selective Seepage Point Collection and Onsite Treatment		X*
MM-3 Selective Continuous Seepage Collection and Onsite Treatment		X*
MM-4 Seepage Point Collection and Onsite Treatment of All Seeps		X*
MM-5 Continuous Seepage Collection and Onsite Treatment of All Seeps	X	
MM-6 Ground Water Extraction by Wellpoints and Onsite Treatment		X

* Alternatives MM-2 through MM-4 were eliminated in lieu of Alternative MM-5, based on a comparison evaluation of effectiveness vs. cost.

EXHIBIT 1

TOWN OF SPRINGFIELD
ORDINANCE 88-2

Be it ordained by the Town of Springfield:

SECTION I. PURPOSE: For protection of the health, safety, and welfare of the inhabitants of the Town of Springfield, it is necessary for the Board of Selectmen to have authority to determine where and when necessary, that certain parcels of land within the Town contain hazardous wastes, toxic materials or harmful chemical matter. Upon such determination, the Board of Selectmen may restrict the uses and activities upon said lands consistent with the provisions hereinafter set forth.

SECTION II. This Ordinance shall apply to any parcel of land determined to contain hazardous waste, harmful and/or toxic substances by the United States Environmental Protection Agency (EPA) and declared to be a Superfund Site or an otherwise hazardous place.

SECTION III. This Ordinance shall also apply to any parcel of land determined to contain hazardous waste, harmful and/or toxic substances by the Board of Selectmen of the Town of Springfield, or any applicable agency of the State of Vermont.

SECTION IV. The restrictions hereinafter set forth may apply to any parcel of land adjacent to land determined to be subject to Sections I-III hereof, or to any parcel of land which carries seepages or any above or below ground watercourse containing hazardous or toxic materials from land defined in Sections I-III.

SECTION V. RESTRICTIONS: The Board of Selectmen to protect the health and welfare of the inhabitants of the Town of Springfield may, upon the designation that a parcel of land contains hazardous, harmful or toxic wastes or chemicals, by resolution, restrict the subject land in one or more of the following ways:

A. Prohibit the construction of, or the maintenance of, habitable buildings or other structures upon the subject premises;

B. Prohibit the breaking of the surface of the soil by digging, trenching, drilling, boring or disruption of the soil surface;

C. Prohibit the growing of crops upon the subject premises, the consumption thereof or transportation thereof;

D. Prohibit any residential, commercial or recreational use of said premises;

E. Prohibit the taking, use or consumption of water from or which flows through the subject premises either above or below the soil surface;

F. Prohibit the excavation, filling or depositing of any solid or liquid material on the subject premises, including the sewage, sludge or other waste material;

G. Prohibit the making of any change in the topography of the subject premises;

H. Prohibit the entry upon the subject premises by any person where the degree of danger is such as to be a threat to life or to health;

I. Prohibit any activity on or near the subject premises which would tend to alter the water table thereon;

J. To place any other restriction on the subject premises which may in the exercise of prudence be necessary for public protection, including posting or fencing of the premises.

SECTION VI. The Board of Selectmen shall designate such parcels of land as are subject to this Ordinance by Resolution, and in said Resolution determine the applicable restrictions necessary to carry out the purposes of this Ordinance.

SECTION VII. Prior to the adoption, modification or removal of a limitation imposed by Resolution pursuant to the terms of this Ordinance, the Board of Selectmen shall cause notice to be given to each affected landowner, and to any other person who may have a record interest in said premises, and shall also give notice to any necessary State or Federal agency.

A. Notice. Notice shall include:

(1) A statement of the time, place and nature of the hearing;
(2) A statement of the legal authority and jurisdiction under which the hearing is to held;
(3) A reference to the partiuclar sections of the statutes and rules involved; and
(4) A short and plain statement of the matters at issue.

If the Board of Selectmen or other agency is unable to state the matters in detail at the time notice is served, the initial notice may be limited to a statement of the isssues involved. As soon as possible thereafter, a more definite and detailed statement shall be furnished.

B. Hearing. All persons who respond to said notice shall have opportunity to present evidence and argument on all issues involved.

C. Informal Disposition. Unless precluded by law, informal disposition may be made by stipulation, agreed settlement, consent order, or default.

D. Record. The record in each case shall include:

(1) All pleadings, motions, intermediate rulings;
(2) All evidence received or considered;
(3) A statement of matters officially noticed;
(4) Questions and offers of proof, objections and rulings thereon;
(5) Proposed findings and exceptions; and
(6) Any decision, opinion or report.

E. Evidence. Findings of fact shall be based exclusively on the evidence and on matters officially noticed.

F. Transcript. Oral proceedings or any part thereof shall be transcribed on request of any party subject to other applicable provisions of law, and upon payment by the requesting party of the reasonable costs thereof.

Dated at Springfield, County of Windsor and State of Vermont, this 18th day of April 1988.

TOWN OF SPRINGFIELD

Board of Selectmen

June 10, 1988

I hereby certify that the foregoing is a true copy of Ordinance 088-2 as it appears in the Book of Ordinances for the Town of Springfield, Vermont.

Attest: Bonnie B. Greer, CMC
Town Clerk

EXHIBIT 2

Office of the Manager

TOWN OF SPRINGFIELD
SPRINGFIELD, VERMONT 05156 / (802) 885-2104

August 24, 1988

RECEIVED
AUG 3 0 88
ME & VT WASTE
MANAGEMENT BRANCH

Paula Lia Fitzsimmons
Remedial Project Manager
U.S. Environmental Protection Agency
Region 1
JFK Federal Building
Boston, MA 02203

RE: Old Springfield Landfill Site

Dear Paula,

This letter is in response to your inquiries made to the Town of Springfield with regards to the possible use of the Springfield Sewage Treatment Plant in remediation efforts of the Old Springfield Landfill Site. As you are now aware, so-called "Operative Unit No. 1", the remedial alternative presented to EPA by Emhart Corporation, Textron Corporation and the Town of Springfield in June of 1988 included as part of the leachate treatment system the utilization of the Town's wastewater treatment facility.

That "offer" was made only after careful consideration of the Town's administrative staff and elected officials. Our decision to include the plant was based primarily upon a report provided to the Town by the engineering firm of Dufresne-Henry. I am including with this letter a copy of the analysis provided the Town by Dufresne-Henry for your consideration.

While at this juncture, I am still comfortable with the concept of making available the treatment plant, as part of the leachate treatment system, I must reserve the right to once again have our engineering consultants, Dufresne-Henry, evaluate the specifics of any new or revised proposal. This is said in light of the fact that we must recognize we are not at the point in the process where we know the specific design criteria of the final system. Therefore, it is impossible for me and the Town to make a final decision on the involvement of the POTW without first realizing what a proposed pretreatment process and other details will entail. This is not to say that I have any reason to believe that a mutually satisfying arrangement cannot be made. Additionally, I understand that it is premature to know who will be responsible for the design and implementation of the remedy; however, regardless of how those negotiations end, I welcome the opportunity to work with the design engineers in involving the Town's POTW.

Furthermore, it has recently been expressed by citizens living in the area of the Old Springfield Landfill Site that they are concerned with locating a pretreatment facility on or near the site. Upon hearing those concerns, the Springfield Board of Selectmen made an offer to consider locating a pretreatment facility on or near the location of the current Town POTW. I again extend this offer to the EPA for consideration; but, again, I must qualify that offer by reserving the right to make further evaluations of the matter as more detail becomes available. And like the POTW, the Town feels it necessary to be involved in the design efforts of the final remedial plan.

Sincerely,

William R. Steele

William R. Steele
Town Manager

WRS/jf

cc: Linda Biagioni, Emhart Corporation
Paul Duff, Textron Corporation
Gerald Conklin, President, Dufresne-Henry
John Parker, Esq.

APPENDIX 1

REM III PROGRAM

REMEDIAL PLANNING ACTIVITIES AT SELECTED UNCONTROLLED HAZARDOUS SUBSTANCE DISPOSAL SITES WITHIN EPA REGIONS I - IV

EPA CONTRACT NUMBER: 68-01-7250
WORK ASSIGNMENT NUMBER: 50-1L39

FINAL RESPONSIVENESS SUMMARY
OLD SPRINGFIELD LANDFILL SITE
SPRINGFIELD, VERMONT

SEPTEMBER 1988

Prepared By:

Diane E. Ready
Community Relations Specialist
REM III/ICF Incorporated

Approved By:

Russell H. Boyd Jr., P.E.
REM III Regional Manager
Region I
Ebasco Services, Inc.

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Preface

The U.S. Environmental Protection Agency (EPA) held a public comment period between July 8, 1988 and August 24, 1988 for interested parties to comment on the Remedial Investigation (RI), Feasibility Study (FS), and Proposed Plan for the Old Springfield Landfill Superfund site. The RI, released by EPA in September 1985 and the Supplemental RI, released in June 1988, examine the nature and extent of contamination at the site. The FS, released by EPA in July 1988, examines and evaluates various cleanup options, called remedial alternatives, for addressing contamination at the site. EPA announced its preferred alternative for the cleanup of the site in the Proposed Plan issued at the start of the public comment period.

The purpose of this Responsiveness Summary is to document EPA responses to the comments and questions raised during the public comment period. EPA considered all of the comments summarized in this document before selecting a final remedial alternative for the Old Springfield Landfill site.

This Responsiveness Summary is divided into the following sections:

I. Overview of the Preferred Alternative and Other Remedial Alternatives Considered in the Feasibility Study - This section briefly outlines the remedial alternatives, including EPA's preferred alternative, that are described and evaluated in detail in the Feasibility Study and the Proposed Plan.

II. Background on Community Involvement and Concerns - This section provides a brief history of the site and of community interests and concerns regarding the Old Springfield Landfill site.

III. Summary of Comments Received During the Public Comment Period and EPA Responses to These Comments - This section summarizes both written and oral comments received by EPA during the public comment period and provides EPA's responses to them. These comments are separated into three categories: 1) comments from citizens; 2) comments from potentially responsible parties (PRPs); and 3) comments from the State of Vermont.

IV. Summary of Concerns Raised During the Informal Question and Answer Period of the July 21, 1988 Public Meeting - This section summarizes questions raised after the close of the public hearing portion of the July 21, 1988 public meeting during which EPA accepted formal comments. This section also provides EPA responses to these questions.

V. Remaining Concerns to Be Addressed by EPA - This section describes concerns to be addressed by EPA during the Remedial Design and Remedial Action (RD/RA) phase of the cleanup process.

This Responsiveness Summary also includes the following attachments.

Attachment A - This attachment lists the community relations activities conducted by EPA to date at the Old Springfield Landfill site.

Attachment B - This attachment includes the complete text of written comments received from PRPs and EPA's detailed responses. The comments and responses in this section expand on the summarized comments and responses provided in Section III. B. of this document.

Attachment C - This attachment consists of the complete text of written comments offered by the State of Vermont.

I. OVERVIEW OF THE PREFERRED ALTERNATIVE AND OTHER REMEDIAL ALTERNATIVES CONSIDERED IN THE FEASIBILITY STUDY

Alternatives Evaluated in the Feasibility Study

The Feasibility Study (FS) prepared by EPA for the Old Springfield Landfill site identifies and evaluates seven remedial alternatives for achieving EPA's cleanup objectives for the site. The seven remedial alternatives are organized into two categories: 1) source control alternatives to address the source of contamination present at the site, and 2) management of migration alternatives to address the spread of contamination. The FS for the Old Springfield Landfill site also examines resident relocation alternatives as a component of the source control alternatives.

The Proposed Plan, which identifies the alternatives EPA recommends for the site, also contains brief descriptions of each of the alternatives considered in detail in the FS. These source and management of migration alternatives, including the preferred alternatives identified in the Proposed Plan, are outlined below. More complete descriptions of these alternatives are contained in the FS and Proposed Plan for the site, which are available as part of the Administrative Record for the site at the Springfield Public Library and the EPA Records Center at 90 Canal Street, Boston, Massachusetts.

After consideration of comments received from the public, the State of Vermont, and the PRPs during the public comment period, EPA has decided to address source control issues at the site separately from the management of migration issues. This means that EPA will issue at least two distinct RODs for the site, one that addresses management migration through an operable unit for seeps and a subsequent one that addresses source control issues. This responsiveness summary is being developed in conjunction with EPA's ROD outlining a remedy to address management of contaminant migration through the seeps at the site. A source control alternative, including a relocation option, will be selected and described in a separate Record of Decision for the site, to be developed after further site study in accordance with comments received during the public comment period.

1. Source Control

The purpose of implementing a source control remedial alternative at the Old Springfield Landfill site is to address soil contamination, which is considered to be a source of groundwater contamination. The FS for the Old Springfield site evaluates the five source control alternatives outlined below.

unsuitable for incineration, would be placed in an on-site RCRA landfill, as described in alternative b. above. Residents would be relocated under this alternative.

d. __In-Situ Vitrification__ - This alternative would require excavating contaminated waste and placing it in on-site trenches. Electrodes would be placed in the waste trenches to melt, or vitrify, the waste. The extremely high temperatures generated would destroy many of the contaminants and solidify any remaining contamination into a glass-like substance. The trenches would be covered with fill and seeded to provide a vegetative cover. Residents would be relocated under this alternative.

e. __No Action (soils)__- This alternative would involve leaving contaminants untreated on site, and fencing and monitoring the site. Resident relocation would not be necessary to implement this remedy.

2. Management of Migration

The FS also evaluated two alternatives to manage the migration of contaminants by collecting and treating contaminated groundwater and leachate to prevent the spread of contamination. These alternatives are outlined below:

a. __Continuous Leachate Seepage Collection and Treatment (Preferred Management of Migration Alternative)__ - This alternative would involve construction of underground interceptor trenches to collect all seeps from the slopes descending from the site. Wells would be installed on the western side of the site to extract contaminated groundwater for treatment on-site. The treatment system would use technologies such as air stripping and activated carbon treatment. During air stripping, air is forced up over contaminated water, causing a transfer of volatile contaminants from the water into the air stream. The air is then passed through activated carbon filters, where the contaminants adhere to the carbon so that only treated air is released to the environment.

b. __No action (groundwater)__ - This alternative would require no collection or treatment of contaminated groundwater, only long-term monitoring of contamination levels in the groundwater.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The 27-acre Old Springfield Landfill Superfund site is located approximately one mile south-west of the city center in Springfield, Vermont. The Springfield Mobile Home Estates, currently consisting of 12 mobile homes, is located on the site. The site has contained up to 43 mobile homes since its opening. A six-building condominium complex and 13 single family residences are also located near the site.

The Old Springfield Landfill, also referred to as the Will Dean Dump, was operated on the site between 1947 and 1968. Shortly after the landfill closing, the site was sold and the former landfill was developed for use as a mobile home park. There was little public interest in the site prior to the sale of the closed landfill, however upon proposal of the mobile home park, neighbors to the site petitioned to prevent the development of a mobile home park on the site.

Potential contamination problems at the site were first brought to the attention of the State of Vermont in 1970, when a resident living near the site on Will Dean Road complained that his well water had become foul-smelling. Testing by the State of Vermont showed that contamination was present in the well and in a community spring near the site. Subsequently, the State recommended that the affected resident should cease using his well water, and that the spring should be abandoned. A high level of citizen concern and awareness of the site has predominated since the contamination was first confirmed by the Vermont Department of Health in 1974. The major issues of concern to Springfield residents since contamination was confirmed at the site are summarized below.

Water Supply and Water Quality

The major concern shared by residents of the mobile home park and neighbors of the site has been the site's potential impact on groundwater quality, and problems in securing alternative water supplies for affected residents. After the State confirmed contamination in well water near the site, the Town of Springfield proposed that a one-inch municipal water line that served the mobile home park be extended to serve the resident on Will Dean Road whose well was contaminated. This alternative did not meet the resident's concern that site contaminants could enter the one-inch water line, contaminate household plumbing, and pose a potential threat to human health. The matter was settled out-of-court in 1977, and the resident received a partial subsidy from the town to connect to the eight-inch municipal water line.

In 1981, testing conducted by the State of Vermont revealed that contamination was present in two more area wells and in 1982 the site was added to the National Priorities List of sites eligible to receive federal funds for investigation and cleanup. Newspaper accounts of these events heightened community awareness and concern about the site. A study released by the Vermont Department of Health in 1983 concluded that municipal water lines should be extended to affected residents and a full site investigation should be conducted. During community interviews conducted in 1984, residents living near the site expressed anger over continued delays in securing alternate water supplies. The Town of Springfield and two PRPs connected one of the two affected homes in 1984, and connected the second affected home in 1985.

Potential Contaminant Migration

Residents interviewed by EPA in 1985, as well as residents attending public meetings to discuss the site, expressed their concerns that the contamination could be spreading down the steep slopes of the site, as well as into the Black River, which flows to the east of the site. Residents also complained of the potential for exposure to contamination present in the red-tinged seeps that emerge from the slopes of the site. These areas were investigated during EPA's Remedial Investigation of the site conducted between 1984 and 1988. The findings of the Remedial Investigation and Supplemental Remedial Investigation are available as part of the site Administrative Record available at the Springfield Public Library and at the EPA Records Center at 90 Canal Street in Boston, Massachusetts.

Possible Relocation

Since the contamination was first discovered, residents of the mobile home park have been anxious to know whether they would eventually be relocated because their homes sit directly over the former landfill. Many have said that they did not know the park was built over a former landfill when they moved into the area. Residents of the park have consistently requested that EPA provide ample warning of any plan to relocate residents. Since work began at the site, EPA has informed residents that because waste was located beneath residences, relocation would be considered as part of the remedy for the site, however no decision on whether relocation would be necessary could be made until EPA completed the site investigation and evaluation of cleanup options.

Progress of the Site Investigation

At public meetings held by EPA concerning the Old Springfield Landfill site, residents have complained of delays in taking action at the site. Residents noted that EPA announced its plans for conducting a site study in 1983, but did not begin the investigation until 1984. Community concern over unresolved water quality issues remained high even after the site study commenced. After the municipal water line was extended to serve affected residences, concern shifted to complaints about the length of the study and the length of time before the site cleanup could begin.

Cost Allocation

The community has voiced concern about the potential cost to the Town of Springfield, for extensions of water service, the site investigation, and eventual cleanup. The Town of Springfield has been identified as a potentially responsible party at the site and residents fear costs to the town will be passed on to local taxpayers.

Effects on Property Values

In community interviews conducted by EPA and during public meetings to discuss the site, residents have expressed concern about the site's impact on the value of their properties on or near the site. One resident complained that his property had been assessed at a higher value since discovery of contamination at the site, despite the fact that, at the time of the assessment, no public water supply had yet been made available to him. The resident did not feel he should pay higher taxes on his property, since he did not have what he considered and adequate water supply.

Limits to Development

The owner of the mobile home park voiced concern about economic losses to his business at the mobile home park pending the outcome of EPA's study of the site. Residents also expressed concern that the site would discourage businesses and individuals from locating in Springfield.

III. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS

This Responsiveness Summary summarizes the comments received by EPA concerning the Remedial Investigation (RI), the Feasibility Study (FS) and the Proposed Plan for the Old Springfield Landfill site. Eleven sets of written comments were received from residents, the potentially responsible parties (PRPs), and the State of Vermont. In addition, two residents offered oral comment during the public hearing conducted by EPA on July 21, 1988. Copies of the hearing transcript are available in the Administrative Record located at the Springfield Public Library and the EPA Records Center in Boston, Massachusetts.

The comments are summarized and organized into the following three sections: 1) comments from citizens; 2) comments from PRPs; and 3) comments from the State of Vermont.

This Responsiveness Summary contains all public comments received during the public comment period on both source control and management of migration alternatives described in the FS, but in this document EPA responds only to those comments on the management of migration decision that is the subject of this ROD. EPA will respond to comments on source control alternatives for the site as part of the development of a separate ROD addressing source control issues at the site.

A. COMMENTS FROM CITIZENS

1. Comments on the Preferred Alternative

a) A resident asked if continued horizontal or vertical migration of contaminants could occur if the proposed alternative (capping) is implemented.

EPA Response:
Since this Record of Decision does not address source control, EPA does not think it is appropriate to address this comment at this time.

b) A group of residents asked that area wells be tested annually or bi-annually for contamination after the Record of Decision is signed. Residents also requested that the remedy include a provision for the State to take independent well samples to confirm EPA results.

EPA Response:
EPA has included in the Record of Decision (ROD) continued monitoring of residential wells. The number and location of

the authority to expend fund money to improve the aesthetic quality of an area or alter the remedy to make it more aesthetically pleasing unless it can be shown that such improvements would be cost effective or more protective of human health and the environment.

f) A group of citizens living in the site area asked that EPA treat contaminated groundwater from the site at an off-site treatment facility, such as the Springfield municipal sewage treatment plant. The commenters stated that an on-site treatment facility would be aesthetically detrimental to the neighborhood around the site and would not be as economical as treatment using the existing plant in town. One resident expressed support for pretreatment of waste from the site prior to treatment at the municipal treatment plant.

EPA Response:
EPA concurs that the treatment of groundwater at the Springfield municipal sewage treatment plant may be more cost-effective than the construction of a facility on site. At the time of the release of the Proposed Plan, however, no assurances had been made to EPA that the plant had the willingness, capacity, or ability to treat the contaminants. Since release of the Proposed Plan, the Town of Springfield has demonstrated the willingness and confirmed the capacity to treat the extracted groundwater and leachate at the Publicly Owned Treatment Works (POTW). If the treatment and discharge of the extracted groundwater and leachate meets all state and federal requirements, and should treatment at the POTW prove cost-effective, the groundwater and leachate may be treated at the POTW. Pretreatment also may be implemented, if necessary, to allow for treatment of the extracted groundwater and leachate at the POTW.

Should the POTW not have the ability to treat the extracted groundwater and leachate consistent with Federal and State requirements, a treatment system would be constructed on site.

g) Residents requested that EPA design the cap to maintain the current ground level rather than creating a higher elevation at the site. The residents also asked that well-heads be capped at ground-level to reduce maintenance and risk of injuries.

EPA Response:
See response to citizen comment A.1.a. above.

h) Residents asked that the proposed fence around the site enclose the capped area only and not excavated areas north of the cap

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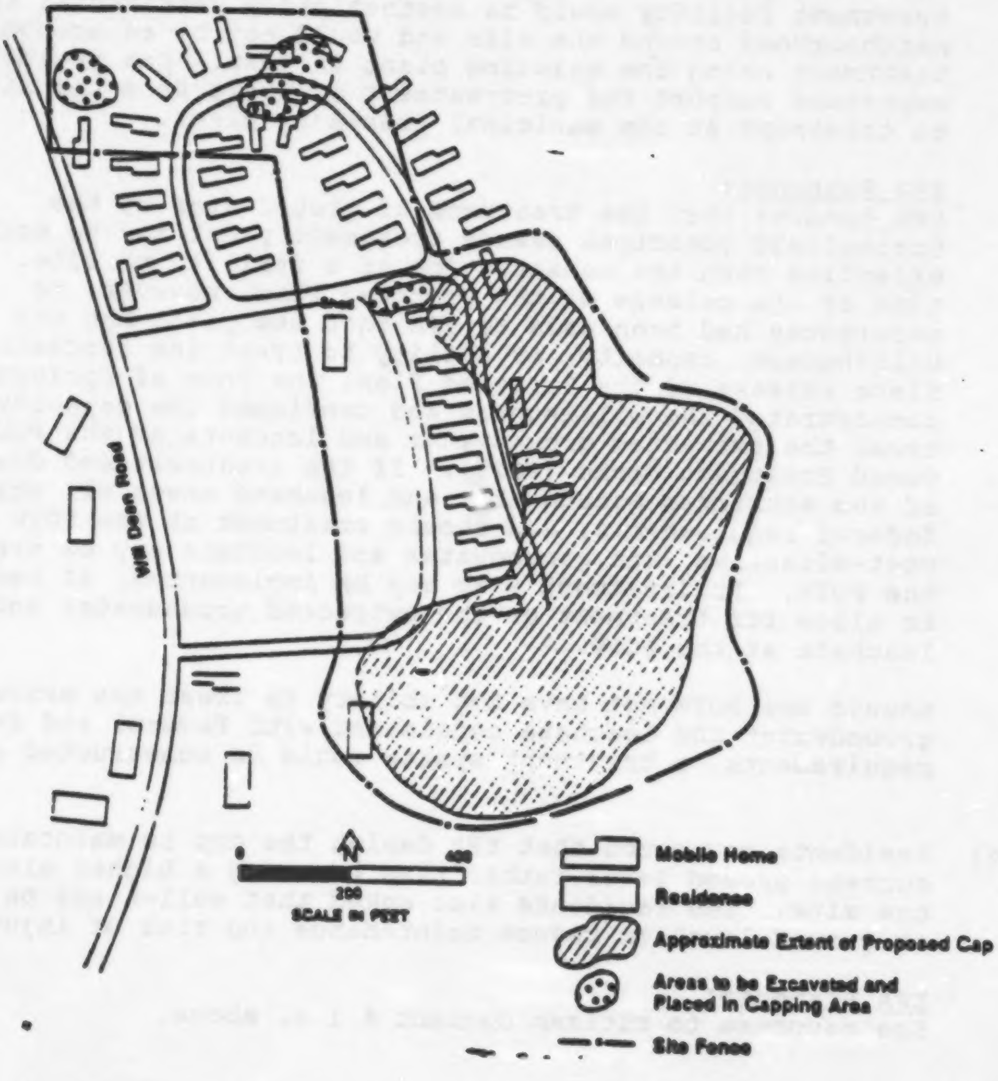
Exhibit 1

Old Springfield Landfill Site
Area of Proposed Cap


Shed
Will Dean Road
0
400
200
SCALE IN FEET
Mobile Home
Residence
Approximate Extent of Proposed Cap
Areas to be Excavated and Placed in Capping Area
Site Fence

(See Exhibit 1). Residents also requested that warning signs be posted along the fence at access points only.

EPA Response:
See response to citizen comment A.1.a. above.

i) Residents asked that EPA do everything in its power to make the Old Springfield Landfill site a model for other remediation efforts and provide for at least minor additional expenditures to meet residents' concerns about the aesthetic impact of the capped site. Residents encouraged cooperation among EPA, the PRPs, and the State of Vermont to achieve a mutually satisfactory and economically reasonable plan for site remediation.

EPA Response:
EPA uses the same strict evaluation criteria to select remedies for all Superfund sites to select the best remedy for each individual site. EPA strives to select each remedy as a model remedy for the specific conditions of each site.

As noted above this remedy does not address source control (capping); however, as for EPA recommending "minor expenditures" for aesthetic improvements, as stated previously, EPA cannot use fund money for additional expenditures that improve only the aesthetics of the remedy and are not legally justifiable.

Regarding cooperation among EPA, the PRPs, and the State of Vermont, the three parties have had and will continue to have discussions about the site. EPA plans to continue these discussions and informational exchanges after the ROD is signed.

j) A resident suggested that excavation of outlying areas and capping of the site be deferred until EPA can evaluate the effectiveness of the leachate collection and treatment system alone. The commenter suggested that EPA should allow rainfall to flow through the site to "flush" contaminants into the leachate collection system for a more cost-effective remedy than constructing a cap.

EPA Response:
See response to citizen comment A.1.a. above.

2. Comments Concerning Public Participation

a) A group of residents asked for a summary in layman's terms of the current and projected human health risks posed by contamination at the site.

EPA Response:
At the public meeting conducted on July 21, 1988, EPA distributed a public information fact sheet explaining the purpose and results of the Endangerment Assessment performed by EPA to identify human health and environmental risks posed by contamination at the Old Springfield Landfill site. The fact sheet also was mailed to all area residents and interested parties on the site mailing list. The fact sheet listed an EPA contact person to call or write for further information about the Endangerment Assessment.

3. Comments Concerning Relocation

a) A resident asked when EPA first discussed the possible permanent relocation of residents of the Springfield Mobile Home Estates.

EPA Response:
EPA has always maintained that relocation, either permanent or temporary would be considered as part of the remedy for the Old Springfield Landfill site, and would be evaluated in the FS for the site. EPA announced its formal proposed plan to permanently relocate residents of the Springfield Mobile Home Estates at a meeting with residents, and a press conference held June 23, 1988. EPA described its proposed remedy, which included permanent relocation, in the Proposed Plan issued on July 7, 1988. Since this Record of Decision does not address source control, and since implementation for the source control remedy necessitated relocation, resident relocation will not be part of this Record of Decision, but will instead be evaluated as part of a subsequent ROD to address source control issues.

b) A former resident of the Mobile Home Park commented that she and her husband had arranged with the potentially responsible parties (PRPs) to sell their mobile home and move off the site. During this move, the couple incurred significant personal expenses in excess of the money they received for their mobile home from the trust fund established by PRPs at the site to facilitate the relocation of mobile home park residents. The commenter complained that the PRPs had not offered them the same terms as had been offered to another resident whose home was purchased by the PRPs. The commenters also expressed their opinion that the Town of Springfield should never have allowed the mobile home park to be built over the former landfill.

EPA Response:
Although EPA included permanent relocation as an element of the proposed plan for the site, EPA will not be including permanent relocation in this Record of Decision. Any purchases of mobile homes are purchases between private parties in which EPA will not intervene.

The construction of the mobile home park was made by the Town of Springfield prior to the enactment of the Superfund laws.

c) Residents expressed support for the plan to permanently relocate residents, and commented that a government agency, not the PRPs, should conduct the relocation of site residents. A resident questioned the methods by which PRPs settled on the fair market value of residents' properties. The commenter asked whether site residents who have not arranged to sell their property to the PRPs should approach the PRPs or EPA for future relocation assistance and information.

EPA Response:
As stated above permanent relocation will not become a final policy decision until a ROD addressing relocation is signed at some future date. This ROD does not address relocation issues. Prior to the source control ROD signing, all purchases are between private parties and EPA has no authority to become involved. If a ROD is signed which includes permanent relocation, all remedial actions at the site will be conducted by either EPA, in cooperation with the Federal Emergency Management Agency (FEMA), or the PRPs working under EPA oversight through a legal Consent Decree. Therefore, residents who wish to sell their mobile homes prior to a ROD which includes permanent relocation may wish to contact the PRPs.

4. Comments Concerning the Extent of Contaminant Migration

a) A resident asked whether the drilling of monitoring wells had created any new pathways for contaminant migration.

EPA Response:
The potential for any monitoring wells to create new pathways for contaminant migration is minimal. All wells were constructed in a manner that minimizes the chances for vertical contaminant movement. None of the wells actually drilled into waste materials penetrated beyond the underlying materials upon which waste materials were originally deposited. Additionally all wells were constructed with the steel augers. As the

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augers were removed, the space surrounding the well was grouted with cement.

b) Residents asked that EPA compose individual letters to each resident in the area describing any contamination or other negative impact that the site or site cleanup may have on his or her property.

EPA Response:
Nearly all samples collected during the Remedial Investigation were confined to the Springfield Mobile Home Estates. A limited number of samples were collected from nearby residential wells, and some soil sampling was done on residential property. Results from all samples were reported in the Remedial Investigation Report, which is available in the site information repository at the Springfield Public Library. Two soil samples were collected from the property immediately to the south of the site. No contaminants were detected in these samples. Four samples were collected from the properties west of the site adjacent to Will Dean Road. In three of these samples, no contaminants were detected. Levels of volatile organic chemicals significantly below federal standards (less than 1 part per million) were detected in one sample collected along Will Dean Road.

Nine domestic wells were sampled for organic and inorganic substances. Low levels (less than .05 parts per million) of organic chemicals were found in four wells, representing low risk values. Two of the wells are located upgradient of the site, and are therefore not in the path of contaminant migration. With the exception of one well located on Route 11, none of the contaminants detected in the sampled domestic wells were contaminants that are found on site. The Route 11 residence has since been connected to the Springfield municipal water supply.

Once design of the remedy is complete, EPA will be able to inform residents of potential impacts, such as noise or truck traffic, that construction of the remedy may have on the community.

EPA does not assess the economic impact that Superfund sites have on adjacent properties, and therefore is not able to comment on any effects that proximity to the site may have on property values. (See response to Comment A.5.a., below.)

c) Several commenters asked whether EPA's site investigations identify the full extent of vertical and horizontal migration of contamination.

EPA Response:
The investigation of a hazardous waste site is primarily an effort to sample a natural environment which is always dynamic, extremely variable in composition from place to place, and very large in comparison to the volume of samples that can be collected. Because the entire environment cannot be sampled, the full extent of contamination will never be known to its exact limit. However, the objective of any such investigation is not to determine the absolute limit of contamination, but to obtain a representative understanding of how contaminants are distributed so that risks to human health can be estimated and cleanup alternatives can be designed with a reasonable degree of certainty. At the Old Springfield Landfill site, it has taken nearly three years and over 500 environmental samples to achieve such an understanding. These investigations have resulted in a good understanding of the extent of contamination at the Old Springfield Landfill site, allowing EPA to make its decision on a site remedy. The potential for additional sources of contamination and undetected migration pathways to exist is small. Even so, future cleanup remedies will include monitoring to safeguard against the possibility of undetected contamination.

5. Comments On the Future Impact of the Site on Property Values and Land Use

a) Off-site residents living near the site asked whether EPA would place any restrictions on the future use of their property or wells as a result of contamination from the Old Springfield Landfill site.

EPA Response:
The selected remedy includes restricting the use of groundwater where residual contamination may exceed maximum contaminant levels (MCLs). EPA recommends to the State and Town of Springfield that they implement and enforce ordinance 88-2 passed by the Town of Springfield. Ordinance 88-2 gives the Town of Springfield control over the use of any hazardous waste sites in the town. Specifically, EPA recommends prohibiting groundwater use in the area bounded by Route 11 on the east, Mr. Curtin's present property boundary on the south, Seavers Brook Road on the west, and Mr. Curtin's present property boundary on the north until such time that groundwater levels fall within MCLs.

b) Residents asked whether proximity to the site affects the fair market value of their property. Residents also requested that EPA prepare local property impact statements, which would be similar to environmental impact statements, to be used during the evaluation of remedial alternatives.

EPA Response:
As already noted, EPA's authority at a Superfund site is limited to activities that protect human health and the environment. EPA does not assess the economic impact that Superfund sites have on adjacent properties. Because the site is not likely to be the only factor affecting property values in the area, the Town of Springfield may better be able to address questions related to property value assessments within its borders.

c) Residents suggested that, to avoid problems associated with absentee ownership, the ownership of the site should be transferred to the Town of Springfield since the Town will be responsible for long-term maintenance of the site.

EPA Response:
EPA will determine the party who will be responsible for long-term maintenance of the site through negotiations between EPA and the PRPs, including the Town of Springfield. If no agreement can be reached, EPA can implement the remedy using Superfund money, and the State of Vermont would be responsible for operation and maintenance of the remedy.

d) Residents asked that EPA build flexibility into the ROD to ensure funding to address any new areas of contamination that may be detected during future EPA cleanup activities at the site.

EPA Response:
Since the remedy is an operable unit for seeps and limited groundwater contamination, and does not include a remedy for source control, EPA will continue its investigation of contamination at the site. If the total remedy is not a permanent remedy, under the Superfund law it will be re-examined every five years to evaluate whether any modification of the remedy should be implemented to protect human health and the environment in the vicinity of the site.

B. COMMENTS FROM THE PRPs

Written comments were submitted by the law firm of Breed, Abbot, and Morgan, and by REMCOR, consultants to Textron, Emhart Corporation, and the Town of Springfield who are some of the PRPs at the site. The full text of these written comments, and detailed

EPA responses, is appended as Attachment B of this document. Below is a summary of PRP comments and EPA responses.

1. Comments on the Preferred Alternative

a) The selection of the 10^{-7} incremental cancer risk as the target risk level does not appropriately reflect site characteristics and is not consistent with recent EPA Region I policy at other sites.

EPA Response:
EPA did not select the 10^{-7} incremental cancer risk as the target risk for this operable unit for seeps. EPA chose target risk levels between 10^{-4} and 2×10^{-6} for groundwater cleanup, which are within the risk range of 10-4 to 10-7 for Superfund remedies. These target risk levels are consistent with recent EPA Region I policy at other sites.

Because this remedy does not address source control, EPA does not this it is appropriate to address this comment at this time.

b) The Remedial Investigation does not support the need for the capping of the landfilled wastes to protect against future ingestion of bedrock ground water to the east of the former landfill. EPA's calculations regarding contaminant migration into the bedrock aquifer and air are erroneous. EPA's calculations concerning exposure to contaminants through consumption of fish from the Black River are erroneous.

EPA Response:
Because this remedy does not address source control, EPA does not think it appropriate to address this comment at this time.

c) The Remedial Investigation does not support the need for capping landfilled wastes to protect against off-site exposure to contaminants via inhalation of chemicals in landfill gas.

EPA Response:
See response to PRP comment B.1.b. above.

d) The outslopes of the former landfill should not be capped.

EPA Response:
See response to PRP comment B.1.b. above.

e) The potential risk associated with contact with contaminated surface soils suggests covering and fencing approximately 1.5 acres of the former landfill to address a target risk level of 10^{-6}, rather than constructing the eight acre-cap described in EPA's Proposed Plan.

EPA Response:
See response to PRP comment B.1.b. above.

f) The data do not support the need for the cap proposed by EPA. The Record of Decision should specify performance objectives rather than a detailed cap configuration.

EPA Response:
See response to PRP comment B.1.b. above.

g) The data developed in the Remedial Investigation do not support the need for excavation of areas beyond the limits of the former landfill and consolidation of these materials under the proposed cap.

EPA Response:
See response to PRP comment B.1.b. above.

h) The design of the leachate collection system on the eastern side of the site should be modified to address collection of those seeps evidencing contamination, and the instability of the eastern outslopes should be considered in locating the collection system.

EPA Response:
As part of the final remedy for the site, EPA will require the collection of all leachate seeps on the eastern and western slopes of the site. The actual design of the leachate collection system will be completed during the remedial design phase of the cleanup. In addition, EPA has specified certain performance objectives for the leachate collection and treatment system in the ROD.

i) Placement of interceptor wells along Will Dean Road into the sand and gravel water bearing zone should be reevaluated.

EPA Response:
EPA recognizes that sufficient data for the final design of the well extraction system currently is not available. Further evaluation is recommended in the FS (see the FS report, p.7-127). Specific items to be designed include the number of extraction wells, well placement, and extraction rates.

However, some wells will be installed to address groundwater contamination in the Will Dean Road area identified in this comment.

j) Leachate (and extracted groundwater) from the site should be pretreated and discharged to the Springfield Publicly Owned Treatment Works (POTW) or to a new facility built on land adjacent to the municipal treatment plant, rather than discharged directly to surface drainage following on-site treatment.

EPA Response:
See EPA response to the citizen comment in section A.1.f. of this document.

k) The slurry wall proposed by EPA as an option within the preferred alternative would have limited effectiveness.

EPA Response:
As part of this ROD, additional studies will be done to determine the feasibility of diverting groundwater from contact with the waste. The evaluation for the effectiveness a slurry wall will be determined at that time.

l) The seep collection system and treatment plant should be designed after the ROD is signed, during the design phase of the remedy implementation.

EPA Response:
The seep collection will be designed after the ROD is signed to meet the objectives outlined in the ROD. As stated above, in the ROD for the site EPA expresses a preference for use of the POTW and would require construction of a new treatment facility only if the criteria outlined in the ROD cannot be met.

2. Comments on Enforcement Issues

a) If there is a basis for the suggestion by the State of Vermont that there are uncertainties regarding the ownership and operation of the landfill, Emhart Corporation and Textron would like an opportunity to submit additional comments and evidence to EPA on this issue.

EPA Response:
EPA welcomes efforts to provide pertinent information.

b) The Participation Agreement among Emhart, Textron, and the Town of Springfield provides a structure for cooperation among the parties, while specifically disclaiming any binding allocation of responsibility with respect to the site. The agreement to date is limited to such matters as relocation of residents and conduct of technical activities and does not in any way address the remedy to be adopted at the site.

EPA Response:
EPA was and is not a party to the participation agreement among the PRPs and therefore offers no response to this comment.

C. STATE OF VERMONT COMMENTS

The full text of comments offered by the State is appended as Attachment C of this document.

1. Extent of Contamination

a) EPA should further investigate the bedrock hydrogeology east of the site to ascertain whether contamination in the bedrock may represent an additional exposure pathway and whether extraction and treatment of the groundwater from the bedrock might be necessary. Also, if all of the contaminated groundwater moving through the sand and gravel unit discharges into the western seeps, then it appears that the extraction wells may not be necessary.

EPA Response:
EPA's current findings indicate that contamination has not reached bedrock east of the site. As part of the long-term monitoring of the site, the ROD prescribes the installation and monitoring of additional bedrock monitoring wells. These wells will be designed to ascertain whether contamination may be present in the bedrock and to detect potential contamination in the future. It is EPA's practice to extract and treat contaminated groundwater where feasible. EPA intends to place groundwater extraction wells in a highly permeable zone at the Old Springfield Landfill site to facilitate the cleanup of groundwater in the area.

b) EPA should investigate and define waste disposal areas on the western side of the site to identify any potential risk and determine whether any remedial action is warranted.

EPA Response:
The ROD includes a provision for exploration of waste disposal areas on the western slopes of the site and an area of the

southwest portion of the site as indicated by geophysical techniques used in the Remedial Investigation.

2. The Preferred Alternative

a) EPA should provide a clearer explanation of how it determined the depths to which EPA would excavate contaminated soil from outlying areas of the site. EPA also should specify the depths to which contaminants from sloped sections of Waste Areas 2 and 3 would be excavated, and how EPA would resolve the potential problem of continued leaching from contaminants left beneath the excavated areas.

EPA Response:
See response to PRP comment B.1.b. above.

b) It may be possible that with proper pre-treatment the Springfield sewage treatment plant may be able to accept collected leachate from the site. The Vermont Department of Environmental Conservation notified EPA that additional information is necessary for DEC to determine if the town treatment plant can be used as part of a more cost-effective remedy.

EPA Response:
See EPA response to citizen comment A.1.f., above.

c) The proposed remedy relies heavily on future operation and maintenance activities that could place a large burden on the resources of the State of Vermont and the Town of Springfield. Because operation and maintenance activities may have to be continued indefinitely into the future, the proposed remedy may not meet the requirement for a permanent remedy.

EPA Response:
See EPA response to citizen comment A.1.c. above.

2. Cost Allocation

a) There is a lack of information to conclusively resolve the historic ownership and operation issues and resulting allocation of costs for site remediation.

EPA Response:
It is EPA's current understanding that the site was operated by the Town of Springfield. Issues related to making a determination of the allocation of costs of the site cleanup

among the PRPs will be addressed during negotiations between EPA and the PRPs after the signing of the ROD.

IV. SUMMARY OF CONCERNS RAISED DURING THE INFORMAL QUESTION AND ANSWER PERIOD OF THE JULY 21,1988 PUBLIC MEETING AND EPA RESPONSES

The following section summarizes questions asked after the close of the portion of the July 21, 1988 public meeting devoted to accepting formal public comment. EPA is responding to these informal questions in this document to address issues of concern to the community that were not raised as part of the formal public comment process.

A. Comments on Health Studies

1) A resident asked whether the State of Vermont monitored the health of residents at EPA Superfund sites.

EPA Response:
The State of Vermont does not have any program to monitor the health of residents in the vicinity of federal Superfund sites.

B. Comments on the Preferred Alternative

1) A resident asked EPA to improve a deteriorated section of roadway leading to the site during the implementation of the remedy.

EPA Response:
Improving road conditions goes beyond EPA's authority to cleanup the waste at the site. Road maintenance is an issue that the Town of Springfield may better be able to address.

2) A resident asked whether the preferred alternative proposed for the Old Springfield Landfill Site has been successfully implemented at similar Superfund sites elsewhere in the United States.

EPA Response:
Because each site is different and presents unique challenges, the success or failure of a remedy at one site cannot be used to predict the likelihood of success or failure at another. However, leachate collection and groundwater extraction are remedial actions that are commonly used as parts of groundwater cleanup at Superfund sites.

3) A resident asked when cap construction would begin if EPA selects a cap as part of the site remedy.

EPA Response:
Because this remedy does not address source control, EPA is unable at this time to predict when a source control remedy would be selected and implemented.

4) Residents were concerned about the aesthetic impact of the cap. i.e., what kind of fence and vegetation would be used and whether trees could be planted on or around the cap.

EPA Response:
Since this ROD does not address source control, EPA is unable to address this comment at the present time.

5) Residents asked whether EPA could implement cleanup innovations perfected in the future, if a cap is used as the current remedy for the Old Springfield Landfill site.

EPA Response:
See EPA response to comment IV.B.4. above.

6) What effect will the groundwater cleanup activities have on groundwater levels south of the site.

EPA Response:
The passive collection of the seeps at the point of emanation will not have an effect on groundwater levels south of the site. The active pumping at an estimated 15 gallons per minute (gpm) from the wells in the sand and gravel zone on the west side of the site should not have a detectable influence on off-site wells south of the site.

C. Comments on the Public Participation Process

1) Several residents wanted to know how EPA would respond to comments offered during the public comment period and whether a public meeting could be held to discuss EPA's responses to all comments.

EPA Response:
EPA summarizes and responds to public comments received during the comment period in this Responsiveness Summary, which is issued with the ROD. The Responsiveness Summary presents a brief summary of the information that EPA used to evaluate the public comments received during EPA's decision-making process

toward drafting the final cleanup approach described in ROD for the site. Both the ROD and Responsiveness Summary are available to the public as part of the Administrative Record for the site available at the Springfield Public Library and EPA Records Center in Boston, Massachusetts.

EPA considered all comments received during the public comment period in carrying out its responsibility to select a remedy that meets EPA's nine criteria for remedial alternatives. These criteria are:

1. Overall Protection of Human Health and the Environment;
2. Compliance with Applicable or Relevant and Appropriate Requirements;
3. Long-term Effectiveness and Permanence;
4. Reduction of Toxicity, Mobility, and Volume;
5. Short-term Effectiveness;
6. Implementability;
7. Cost;
8. State Acceptance; and
9. Community Acceptance.

Because often no single alternative meets each of these nine criteria equally, EPA selects the alternative that would achieve the best balance among the nine criteria.

In response to the request of area residents, EPA will hold a public meeting to discuss the ROD and Responsiveness Summary during the fall of 1988, after the signing of the ROD.

2) A resident suggested that EPA work with residents, PRPs, and the State of Vermont to gather information about the site and to develop an appropriate cleanup response to site contamination.

EPA Response:
EPA has worked with residents, the PRPs, and the State of Vermont throughout the site investigation and evaluation of cleanup alternatives for the site. As one of the first steps in EPA's Remedial Investigation of the site EPA placed newspaper advertisements asking that anyone with information about the site come forward. EPA conducted geophysical and other investigations of the site to verify and build on information gathered during interviews with residents conducted during 1984 and 1986. EPA has invited comment and input from all interested parties, including the PRPs and the State, at numerous public meetings and through information fact sheets distributed to area residents and interested parties throughout the process of investigating and evaluating remedial alternatives for the site. In addition EPA has made documents and technical reports related to EPA activities at the Old

Springfield Landfill site available to the public at the information repository at the Springfield Public Library.

3) A resident asked for an explanation of the way the criteria of State and Community Acceptance are factored into EPA's final selection of a remedy for the site.

EPA Response:
Because community residents may offer divergent comments on the Proposed Plan, EPA must gauge whether there is a majority view among the community, based on the number and content of comments received. EPA weighs community comments and the State's comments as two of the nine factors to consider in selecting a remedy for site contamination. EPA does not retain or reject a remedy, however, based on how well the remedy meets any single criteria, but rather on how well the remedy meets the sum of the nine criteria. (See comment IV. C. 1. for the list of nine criteria.)

4) Commenters asked if the comment period could be extended beyond August 8, 1988.

EPA Response:
EPA extended the public comment period to August 24, 1988. Notice of the extension was mailed to all interested parties and announced in local newspapers serving the Springfield area.

5) Residents asked to continue to receive information about the schedule for site cleanup activities.

EPA Response:
Once the design phase of implementing the remedy is underway, EPA will revise the community relations plan that was prepared for the site in 1985 to identify any new or emerging concerns that can be addressed through specific community relations activities. The revised community relations plan will discuss community concerns and outline the activities through which EPA will continue to provide information on site activities to the public during the design and implementation of the remedy.

6) A resident asked to receive copies of the comments EPA receives during the public comment period.

EPA Response:
EPA has forwarded copies of the comments received to the parties that requested them. A transcript of oral comments offered at the hearing, as well as copies of the written comments received during the public comment period, are

available for public review at the Administrative Racord at the Springfield Public Library and at the EPA Records Center at Region I EPA Headquarters, 90 Canal Street, Boston, Massachusetts.

D. Comments on the Contaminant Migration

1) A resident asked if the Blue Grass Hills Condominium properties have been contaminated by the site and if there is any danger to children playing around the condominiums.

EPA Response:
EPA has found that the condominium properties have not been contaminated by the site. Also, the condominiums have always been supplied by town water, so there would be no current health risk to condominium residents due to ingestion of groundwater.

2) A resident asked whether there is a danger of explosion from methane gas generated by the landfill wastes.

EPA Response:
All landfills generate methane gas, which should present no threat of explosion as long as a gas venting system is installed as a way to control the buildup of methane beneath the landfill surface.

V. REMAINING CONCERNS TO BE ADDRESSED BY EPA

Many of the comments offered during the public comment period concerned issues that EPA could not address fully prior to the development of a ROD for the source control operable unit, or prior to the design activities that will follow the signing of the ROD for the management of migration operable unit for seeps at the site. Although these issues are addressed individually in EPA's responses to comments in Section III of this Responsiveness Summary, these items are grouped together in this section as remaining concerns because they include concerns that can be addressed more fully by EPA after the completion of investigations necessary for the development of the exact designs for remedy implementation.

The issues to be addressed through future EPA activities are outlined below.

A. Design of the Cap

Because this remedy does not include capping of the site, EPA is unable to address this issue.

B. Restrictions on Site Use

EPA will identify restrictions on site use that may be necessary to protect the integrity of the design implemented at the site. EPA will recommend restrictions on construction and on the use of groundwater in the area.

C. Design of the Leachate and Seep Collection and Treatment System

Items to be resolved during studies to design the leachate and seep collection system include 1) the exact locations for leachate and seep collection around the site, 2) the number, placement, and rates of extraction for wells to extract contaminated groundwater for treatment, and 3) the feasibility of using the town sewage treatment plant to treat collected leachate from the site.

D. Residential Well Monitoring

EPA will determine the number and location of residential wells to be monitored for contamination, as requested during the comment period, as part of the studies undertaken to design the site remedy.

F. Relocation Assistance

Since this remedy does not address resident relocation, EPA is unable to address this issue.

E. Cost Allocation

The allocation of costs of the cleanup among PRPs will be determined through negotiations between the PRPs and EPA.

As soon as possible after EPA has designed the remedy, EPA will hold a public meeting and release a fact sheet to address the issues outlined above related to the remedy selected for the management of migration operable unit for seeps.

ATTACHMENT A

COMMUNITY RELATIONS ACTIVITIES AT THE OLD SPRINGFIELD LANDFILL SITE SPRINGFIELD, VERMONT

Community relations activities conducted at the Old Springfield Landfill site to date have included:

- **August 1983 - EPA conducted a public meeting to present information about EPA's planned Remedial Investigation of the site.**
- **July 1984 - EPA conducted interviews with community residents to prepare a community relations plan. The community relations plan, released in February 1985, describes citizen concerns about the site, and outlines a program to address these concerns and to keep citizens informed about and involved in site activities.**
- **September 1985 - EPA conducted a public meeting in Springfield to present the results of the Remedial Investigation.**
- **October 16, 1986 - EPA conducted a public meeting to present the Summary Report on the results of the first phase of the site investigation and EPA's work plan for further site investigation activities. EPA released a fact sheet summarizing the results of the Summary Report to those present at the meeting and to the site mailing list of residents requesting written information about the site.**
- **June 2, 1987 - EPA met with the residents of the Springfield Mobile Estates to discuss EPA plans to conduct a temporary relocation of mobile home park residents during investigations to be conducted in the vicinity of mobile homes on the site. Following the public meeting, EPA conducted a press conference. Concurrently, EPA released a brief written update for residents attending the meeting and for those on the site mailing list.**
- **June 11, 1987 - EPA conducted a public meeting to discuss EPA's planned on-site investigation and temporary relocation of residents and to answer questions from the community.**
- **July, 6 - July 18, 1987 - A representative of the Federal Emergency Management Assistance Agency (FEMA) remained at the motel where residents had been relocated to assist residents during the temporary relocation. EPA officials met with residents during the relocation to answer questions**

about the progress of the investigation during the temporary relocation.

- July 11, 1987 - EPA established an information hotline for residents to call for updates on EPA activities at the site and for residents to leave questions and comments for EPA. EPA continues to monitor the hotline and returns calls as soon as possible after they are received.
- March 29, 1988 - EPA conducted a public meeting to present the results of the Supplemental Remedial Investigation (RI), discuss the schedule for future EPA activities, and answer questions from the community. Concurrently, EPA released a fact sheet on the Supplemental RI results and upcoming EPA activities to those attending the meeting and the site mailing list.
- June 23, 1988 - EPA officials met with individual residents of the mobile home park to discuss EPA's recommendation for permanent relocation of mobile home park residents as part of the Proposed Plan for site cleanup. EPA also conducted a press conference to announce its recommendations for permanent relocation of residents and the site cleanup.
- July 7, 1988 - EPA conducted a public meeting to present the results of the Feasibility Study (FS) and Proposed Plan, and answer questions from the community. EPA released its Proposed Plan to those attending the meeting and to the site mailing list.
- July 8 - August 24,1988 - EPA conducted a public comment period to accept oral and written comments for the FS and Proposed Plan. EPA conducted a mailing to all those on the site mailing list to announce the extension of the comment period from August 8 to August 24th.
- July 21, 1988 - EPA conducted a public hearing to accept formal oral comment and answer questions from the community. At the hearing, EPA released a fact sheet presenting the results of EPA's Endangerment Assessment of risks from the site to human health and the environment. The fact sheet was also mailed to persons on the site mailing list.
- August 1, 1988 - EPA met with concerned citizens in the area to listen to comments and concerns.
- August 19, 1988 - EPA held an informal discussion with residents regarding recent progress at the site.

ATTACHMENT B OF RESPONSIVENESS SUMMARY

BREED, ABBOTT & MORGAN
INTERNATIONAL SQUARE
1875 EYE STREET, N.W.
WASHINGTON, D.C. 20006-5471

(202) 466-1100
TELECOPIER (202) 466-2743

NEW YORK OFFICE
CITICORP CENTER
153 EAST 53RD STREET
NEW YORK, N.Y. 10022-4650

WRITER'S DIRECT DIAL

(202) 466-1104

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CHARLES F. GIBBS
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WILLIAM D. HALL*
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GEORGE [illegible] LEE
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[illegible]
JOHN O'HALLORAN
[illegible]
[illegible]
EDWARD J. ROSS
[illegible]
[illegible]
[illegible]
JONATHAN C. STAPLETON
[illegible]
[illegible]
MARY F. VOCE
[illegible]
JAMES B. ZIRIN

*MEMBER OF THE DISTRICT OF COLUMBIA BAR

August 23, 1988

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ME & VT WASTE
MANAGEMENT BRANCH

VIA FEDERAL EXPRESS

Ms. Paula Lia Fitzsimmons
Remedial Project Manager
U.S. Environmental Protection Agency
Hazardous Waste Division (HPS-1)
JFK Federal Building
Boston, MA 02203

Re: Old Springfield Landfill CERCLA Site,
Springfield, Vermont

Dear Ms. Fitzsimmons:

On behalf of Emhart Corporation and Textron Inc., we are submitting these comments for inclusion in the Administrative Record for the Old Springfield Landfill site in Springfield, Vermont. These comments supplement comments submitted under separate cover on behalf of Emhart, Textron and the Town of Springfield.

In its written comments and during the public hearing on July 7, 1988, the State of Vermont suggested that issues regarding state funding obligations under § 104(c)(3) of CERCLA cannot be resolved due to uncertainties regarding the ownership and operation of the Old Springfield Landfill. We cannot understand the basis for this comment since we are not aware of any uncertainties regarding the fact that the Old Springfield Landfill was operated as a public municipal landfill by the Town of Springfield. The Town operated the site for over 20 years pursuant to a 1947 lease agreement with the site owners. If there is a basis for the suggestion by the State of Vermont that there are uncertainties regarding the ownership and operation of the landfill, we would like an opportunity to submit additional comments and evidence to the Agency on this issue.

Secondly, we would like to call EPA's attention to the Participation Agreement between Emhart, Textron, and the Town of Springfield with respect to this site. We are aware that public comments have been made to the effect that this Agreement allocates responsibility between the parties with respect to this site and, specifically, that the Agreement allocates responsibility for the remedy to be adopted at the site. On the contrary, this Agreement merely provides a structure for cooperation among the parties, while specifically disclaiming any binding allocation of responsibility with respect to the site. Furthermore, the agreement to date is limited to such matters as relocation of residents and conduct of technical activities; it does not in any way address the remedy to be adopted at the site.

Yours truly,

Jerome C. Muys, Jr. for
Barry L. Malter

BLM/lc

cc: Ms. Linda Biagioni
Mr. Paul Duff
John Parker, Esq.
Mr. William Steele
Daniel Squire, Esq.
William Walsh-Rogalski, Esq.
Mr. David Webster
Jerome C. Muys, Jr., Esq.

ATTACHMENT B OF RESPONSIVENESS SUMMARY

BREED, ABBOTT & MORGAN
INTERNATIONAL SQUARE
1875 EYE STREET, N.W.
WASHINGTON, D.C. 20006-5471

(202) 466-1100
TELECOPIER (202) 466-2745

OBERT J. BAGDASARIAN
DAVID H. BAMBERGER
ROBERT A. BICKS*
FREDERICK H. BOVENHNER
DERRICK D. CEPHAS
JOSEPH P. DAILEY
RICHARD D. DAILEY
JOHN H. DENNE
STEVEN R. FIPLEY
CHARLES F. GIBBS
RAYMOND J. GUSTINI*
WILLIAM D. HALL*
EDWARD D. HEIN
J. MICHAEL KELLY
KEVIN KEOGH
KENNETH H. KIRSCHNER
DAVID F. KROEHLEIN*
PAUL C. LAMBERT*
STEPHEN R. LANG

GEORGE K. C. LEE
LAWRENCE E. LORBER*
BARRY L. MALTER*
C. MACNEIL MITCHELL
ERIC W. NELSON
JOHN O'CALLAGHAN
DAVID S. PATTERSON
ALAN J. POMERANTZ
EDWARD J. ROSS
JAMES J. SABELLA
JOSEPH W. SCHMIDT
ROBERT W. SHEEHAN
JONATHAN C. STAPLETON
BRIAN L. SULLIVAN
LOGAN T. THOMPSON
MARY F. VOCE
LAWRENCE T. WARBLE
JAMES D. ZIRIN

*MEMBER OF THE DISTRICT OF COLUMBIA BAR

NEW YORK OFFICE
CITICORP CENTER
153 EAST 53RD STREET
NEW YORK, N.Y. 10022-4650

WRITER'S DIRECT DIAL
(202) 466-1104

August 23, 1988

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ME & VT WASTE
MANAGEMENT BRANCH

VIA FEDERAL EXPRESS

Ms. Paula Lia Fitzsimmons
Remedial Project Manager
U.S. Environmental Protection Agency
Hazardous Waste Division (HPS-1)
JFK Federal Building
Boston, MA 02203

Re: Old Springfield Landfill CERCLA Site, Springfield, Vermont

Dear Ms. Fitzsimmons:

The enclosed document, together with the accompanying report by REMCOR, Inc., constitutes the comments of Emhart Corporation, Textron Inc., and the Town of Springfield on the Draft Final Endangerment Assessment, the Draft Final Supplemental Remedial Investigation Report, the Draft Final Feasibility Study Report, and the Preferred Remedial Alternative for the Old Springfield Landfill site in Springfield, Vermont. We ask that these comments be included in the administrative record for the site.

Yours truly,

Jerome C. Muys, Jr. for
Barry L. Malter

BLM/lc
Enclosure

cc: William Walsh-Rogalski, Esq.
Mr. David Webster

COMMENTS OF EMHART CORPORATION, TEXTRON INC., AND THE TOWN OF SPRINGFIELD ON THE DRAFT FINAL ENDANGERMENT ASSESSMENT, THE DRAFT FINAL SUPPLEMENTAL REMEDIAL INVESTIGATION REPORT, THE DRAFT FINAL FEASIBILITY STUDY REPORT, AND THE PREFERRED REMEDIAL ALTERNATIVE FOR THE OLD SPRINGFIELD LANDFILL SITE, SPRINGFIELD, VERMONT

This document and the accompanying report by Remcor, Inc. (which is incorporated herein by reference) constitute the comments of Emhart Corporation, Textron Inc., and the Town of Springfield on the Draft Final Endangerment Assessment ("EA"), the Draft Final Supplemental Remedial Investigation Report ("RI"), the Draft Final Feasibility Study Report ("FS"), and the "Preferred Remedial Alternative" for the Old Springfield Landfill Site in Springfield, Vermont. We ask that these comments, together with our June 8, 1988 submission regarding proposed remedial action at the site, all of our previous correspondence regarding this site, and transcripts and videotapes of all public hearings and meetings be included in the administrative record.

Emhart, Textron, and the Town of Springfield are concerned about site conditions and the welfare of community residents. We have repeatedly demonstrated this concern, even prior to the time that the Environmental Protection Agency ("EPA") designated us potentially responsible parties ("PRPs"), and even prior to EPA's issuance of requests for information under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA" or "Superfund").

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In 1984, we voluntarily extended the municipal water supply to the Murphy residence and, about the same time, we voluntarily offered to perform site studies (the "RI/FS"). More recently, we voluntarily implemented a permanent relocation program, establishing a trust fund to purchase from the residents of Springfield Mobile Home Estates mobile homes at prices suggested by the residents or at fair market value established by independent appraisers. When EPA announced its recommendation for a permanent relocation on June 23, 1988, we had already assisted in the relocation of 12 families and were well under way in providing relocation assistance to an additional 16 families.

On June 8, 1988, prior to EPA's announcement of its preferred remedial alternative, we submitted a proposal to perform remedial work at the site. Our proposal included collection and treatment of contaminated seeps on the eastern and western portions of the site, in a manner similar (though not identical) to the seep collection and treatment proposals announced by EPA on June 23. Our proposal also included measures to prevent direct contact with contaminated soils, including access restrictions and covering those areas of the site which, according to our technical consultants, could pose risks of direct contact.

We strongly support EPA's recommendation for seep collection and treatment, and believe such measures should be undertaken without undue delay. However, the Record of

Decision ("ROD") should provide for collection of contaminated seeps only, with provision for periodic monitoring of additional seeps and expansion of the collection system, if warranted by monitoring data. Moreover, collection system design details should not be specified in the ROD, but should be left to the remedial design phase of the project. Our primary concern is that the collection system design proposed by EPA may not be practical or constructible and may be unnecessarily difficult to maintain in light of the historical instability on the eastern slopes of the site. In addition, community residents are concerned about aesthetic values, and the construction of the collection system proposed by EPA will result in the loss of more forested areas than the system we proposed. These considerations can be taken into account during remedial design activities.

Similarly, the details of the seep treatment system need not be specified in the ROD. To provide maximum flexibility, the ROD should require treatment either at the Town of Springfield's Municipal Treatment Plant (with appropriate pretreatment, if necessary), or on the site, itself. Although we proposed on-site pretreatment systems similar to the on-site system recommended by EPA, we believe that attempts should be made to accommodate the community's concern for aesthetic considerations. It may be possible to locate the treatment system on land adjacent to the Municipal Treatment Plant, and Emhart, Textron, and the Town of Springfield have begun to explore that possibility. The ROD should not foreclose a desirable result.

With respect to other remedial measures, we take issue with the proposed eight-acre, multi-layer, low permeability cap (including synthetic membranes) and the proposed excavation of approximately 25,000 cubic yards of materials for placement under the cap (19,000 cubic yards from outslope areas prefatory to cap placement on the outslopes and 6,000 cubic yards from other areas of the site). These measures, according to the Agency, are proposed to protect against risks of ingestion of bedrock groundwater east of the landfill, consumption of Black River fish, and inhalation of landfill gases. These risks, however, are unsubstantiated. Despite the passage of 40 years since waste was first deposited on the site, the bedrock aquifer to the east of the site is uncontaminated and fish tissue studies revealed no site-related contamination in Black River fish. Additionally, EPA was unable to document contaminants of concern in landfill gases.

The risk assessments allegedly supporting EPA's proposed $12.5 million remedial program, including excavation and capping, are based on a number of erroneous assumptions, incorrect calculations, and highly unrealistic exposure scenarios. For example, EPA's calculation of target soil cleanup levels to mitigate against risks of groundwater ingestion is based on an overstatement of the amount of contaminants predicted to leach from the wastes into the shallow groundwater, an overstatement of the amount of contaminants expected to reach bedrock groundwater, and a failure to consider fundamental environmental transport and fate processes including dilution, dispersion and adsorption. Similarly, the Agency's calculation of soil cleanup target levels to mitigate the risks of inhalation of landfill gases fails to consider the characteristics of the municipal solid waste/soil mixtures on the site, overstates the emission source area by a factor of seven (using maximum contaminant concentrations found anywhere on the site as representative of the entire site), and assumes an emission rate which, if accurate, would result in the depletion of contaminants of concern in the source area within a matter of hours.

The exposure scenarios in EPA's risk assessments do not reflect reality. For example, the inhalation exposure assumed by EPA is based on site residents remaining outside and breathing every breath from birth to age 70 in the vicinity of the highest contaminant levels found at the site. With respect to consumption of Black River fish, EPA assumes that the exposed population consumes contaminated fish from the Black River (which the data show to be uncontaminated) every day over a 70-year lifetime.

Finally, EPA uses as the target risk level a value of 10^{-7} (i.e., one additional case of cancer in an exposed population of ten million) to calculate cleanup levels in soils. However, according to EPA policy, risks within a range of 10^{-4} to 10^{-7} are considered acceptable (one excess cancer in an exposed population of 10,000 to one excess cancer in an exposed population of 10,000,000.) The Office of Technology Assessment of the Congress of the United States has cited with approval the fact that the target level most frequently used by EPA is 10^{-6} (one excess cancer in an exposed population of 1,000,000). We are not aware of any other sites where EPA Region I has selected target risk levels other than 10^{-5} or 10^{-6}.

EPA's calculations, assumptions, and exposure scenarios result in target soil cleanup levels which are far below the limits of analytical detection. In addition, as EPA itself recognizes, almost all of the target cleanup levels for soils at the site are within the natural background levels for forest soils. For example, the natural background level of polynuclear aromatic hydrocarbons in forest soils is 550 times greater than the target cleanup level selected by EPA. And the PCB soil target level selected by EPA for the Old Springfield Landfill is 1,800,000 times lower than the level selected by EPA Region I five months ago for a site in Massachusetts. A risk assessment which calls for remediation of contamination at any location where a contaminant of concern is detected, regardless of background levels, is one that has gone grossly awry.

The flaws discussed above are found throughout the various documents produced by EPA. Rather than commenting on the documents separately, we have organized our comments in the following manner:

I. Comments on Calculation of Target Cleanup Levels in Soil

II. Comments on Cap as Component of Preferred Alternative

III. Comments on Collection and Treatment of Contaminated Seeps

IV. Comments on Groundwater Pumping and Treating

V. Comments on Slurry Wall as Possible Component of Remedy

VI. Conclusion

I. CALCULATION OF TARGET CLEANUP LEVELS IN SOIL

A. EPA's Calculations Regarding Contaminant Migration Into The Bedrock Aquifer Are Erroneous

As a component of its "preferred remedial alternative" for the Old Springfield Landfill Site, EPA proposes to install a low permeability cap over approximately eight acres, and to excavate approximately 25,000 cubic yards of materials from elsewhere on the site for placement under the cap. The primary purpose of these measures, according to the Agency, is to mitigate the potential for migration of site contaminants into the bedrock aquifer.

In determining that there is a potential for migration of site contamination to the bedrock aquifer sufficient to require the proposed uxcavation and capping, EPA calculated, through modeling, the amount of contaminants that could be expected to leach from waste areas into the shallow groundwater at the site. The Agency then assumed, without empirical data, that the deeper bedrock aquifer would become equally contaminated due to a hydrogeologic connection between the two systems. Finally, EPA assumed a range of exposure scenarios, such as ingestion of bedrock groundwater, determined the level of protection it wished to maintain in the bedrock aquifer, and back-calculated from the protective levels in the bedrock aquifer to determine target cleanup levels for soils at the site. These calculations and assumptions resulted in the unprecedented determination that "any location where a contaminant of concern was detected" would have to be remediated. FS at 3-52 (emphasis added). For the following reasons, EPA's calculations and assumptions are in error and do not support the target cleanup levels for soil.

First, EPA miscalculated the amount of contaminants that can be expected to leach from waste areas into the shallow groundwater system. The miscalculation resulted from an error in EPA's determination of how much organic carbon is present in the contaminated wastes and soils. This value is referred to as the fraction of organic carbon (or "FOC").

As a general principle, the higher the organic carbon content of a contaminated material, the less likely it is that contaminants will leach from it. In Appendix A to the FS, EPA utilized an FOC value of 0.0023% to represent the organic carbon content of site materials. The figure used by

EPA reportedly is the geometric mean of five soil (i.e., non-waste material) samples collected at the site during the remedial investigation. Although derivation of the FOC value is critical to EPA's entire analysis, the administrative record (i.e., the documents made public by EPA) does not identify the locations from which the five samples were taken or explain EPA's rationale for selecting those locations.[1]

The overriding factor, however, is that EPA's derivation of the FOC value is based solely on soil samples. But, as would be expected at a municipal landfill, contaminants at the Old Springfield Landfill exist not in soil alone, but within a matrix of municipal solid waste and soil. Municipal solid wastes have been shown to contain much higher levels of organic carbon than soils. See DeMarco, et al. (1969) and Tchobanoglous, et al. (1977) (municipal solid waste may contain from 15% to 80% organic carbon). Thus, it is clear that the FOC value utilized by EPA is not representative of the actual FOC of the municipal solid waste/soil mixtures at the site. Had EPA used even a conservative FOC value of 5%, its prediction of the amount of contaminants expected to leach from the wastes into shallow groundwater would have been significantly reduced.[2]

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[1] Without this information, we are hindered in our ability to comment on EPA's study. EPA's failure to disclose this information violates the Administrative Procedure Act, 5 U.S.C. 551 et seq., and Section 117 of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA" or "Superfund").

The fact that EPA's leach model does not accurately reflect site conditions is apparent from a review of the actual shallow groundwater data. The actual maximum shallow groundwater concentrations of the contaminants of concern are generally an order of magnitude (factor of 10) less than those predicted by EPA through its leach model calculations. See EA Tables 3-4 and 3-5.

Second, EPA has miscalculated the potential for contaminant migration from the shallow groundwater system to the bedrock system. The Agency performed water balance calculations and concluded that approximately 50% of the precipitation (and septic system flows) infiltrates to the bedrock aquifer. RI at 110, Table 4-8. The water balance calculations contain a number of errors that vastly overstate the amount of infiltration to the bedrock aquifer. For example, the data presented in Table 4-7 of the RI indicate that percolation to the bedrock aquifer was modeled assuming a single, fine sandy loam layer, ten feet in thickness. However, EPA's data show that a layer of low permeability till, with an average thickness of 60 feet, overlies bedrock at the site. RI at 89. The till layer, which exhibits an average permeability of 1×10^{-5} centimeters per second (RI

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[2] EPA Region I has assumed a 5% FOC value at other sites which did not contain municipal solid waste. See, e.g., Record of Decision, Keefe Environmental Services, Epping, New Hampshire, March 21, 1988.

Table 4-4), represents a significant barrier to infiltration, but was ignored in EPA's calculations.

In addition, the water balance calculations assume that seepage flow from the eastern seeps is 8.5 gallons per minute (gpm) (RI Table 4-8). Yet, this is the minimum reported value of six seep discharge measurements. See RI Table 4-6. Actual site data show that, with 95% confidence, the average flow from the eastern seeps is 24 gpm (and much greater if the arithmetic mean is used). Using minimum seep flow is arbitrary and irrational when the rest of the values used by EPA in the analysis are annual averages (e.g., precipitation, runoff, and evapotranspiration). This error resulted in a gross exaggeration of the amount of water infiltrating to the bedrock aquifer.

A final flaw in EPA's infiltration calculations is that they ignore site data which indicate that vertical upward gradients exist (i.e., water flows upward) in the bedrock underlying the till in the eastern portion of the site. Water level data from monitoring wells No. 6, 20, and 20D suggest that, at least in part of the site, deep groundwater is flowing upward into the shallow aquifer, therefore reducing the amount of infiltration predicted from the shallow system into the deep aquifer.[3/]

[3/] EPA's confusion about the water balance is shown by inconsistencies within its own documents. For example, the RI states that 50% of the recharge to the site discharges to the seeps (RI at 108) while the FS states that 78% of the recharge discharges to the seeps (FS at 1-14).

Beyond the overstatement of the amount of infiltration reaching the bedrock aquifer is the fact that EPA apparently disregarded water balance calculations and other site data in evaluating the impact of site contaminants on the quality of the bedrock aquifer. Although site data show no contamination in the bedrock aquifer on the eastern portion of the site, EPA assumes, in what is called a "steady-state model," that eventually the bedrock aquifer to the east of the site will contain the same concentration of contaminants predicted to leach from the wastes into the shallow aquifer (which is an order of magnitude greater than the concentrations currently found in the shallow aquifer). Had EPA carried forward the water balance approach and scrutinized other site data, it would have realized that its theory is untenable because it ignores fundamental environmental transport and fate processes including dilution, dispersion and adsorption. As explained in detail in the Rexcor comments, recharge through the waste areas contributes only a small percentage (maximum 12%) of the total flow in the bedrock aquifer to the east of the site. Attenuation of contaminants in this flow reduces the concentrations of those contaminants migrating to the bedrock aquifer by factors ranging from 50 to more than 10,000,000, depending on the specific contaminant. Thus, even if contaminants do reach the bedrock aquifer east of the site, dilution and attenuation would substantially reduce the concentrations predicted by EPA's model.

The effects of attenuation, ignored at this site, are often recognized by EPA. For example, EPA frequently has observed that PCBs are largely immobile in soil and generally do not migrate in groundwater. This determination was set forth very clearly in the March 31, 1988 ROD for the Cannons Engineering Corporation site in Bridgewater, Massachusetts, in which EPA Region I concluded that:

> The cleanup for PCBs is based on a direct contact threat and not a threat of leaching to ground water. Due to the chemical nature of the PCB compound, they are very immobile in soil and do not migrate in ground water. Therefore, it was concluded that the PCBs do not pose a threat to ground water. This conclusion is supported by site data which showed no PCB contamination in the ground water.

The "steady-state model" predicting severe contamination of the bedrock aquifer is contradicted by site data. The eastern portion of "Waste Area 3" has been in existence for more than 40 years, and lies within 400 feet of bedrock monitoring wells 20 and 20D. Data in the RI suggest that the water in the bedrock aquifer to the east of the site is flowing at rates in the range of 80 to 140 feet per year. If the "steady-state model" were correct, wells 20 and 20D would have been contaminated more than 20 years ago. Yet, actual site data show no contamination in these wells. (RI Table 4-10).

B. EPA's Calculations Of Contaminant Migration Via Air Emissions Are Erroneous

The threat of migration of site contaminants in landfill gases apparently is a secondary rationale for EPA's proposal to install a low-permeability synthetic membrane cap (and accompanying gas venting system) over an 8-acre area at the site. However, it is clear that EPA's calculations of inhalation risk are based on unrealistic and unwarranted assumptions concerning the levels of volatile organic compounds ("VOCs") in the soil, the area of the emission source, the frequency of exposure, the amount of organic carbon in the landfilled materials, and the rate at which chemicals are emitted in the landfill gas. In fact, a number of EPA's assumptions are directly contradicted by site data.

EPA's calculations regarding air emissions are based on the assumption that the maximum soil VOC levels are "representative of the entire site." EA at 4-12. (Emphasis added.) Without defining the "entire site", the EA identifies an area of 12,040 square meters as the emission source for purposes of modeling inhalation risks. EA Appendix C at C-16. The EA states that an area-wide emissions source was used as a basis for the calculations because "the data . . . are not sufficient to isolate hot spots of volatile contamination that would allow a more accurate determination of source areas." EA at 4-12. However, Figures 3-12 through 3-14 of the RI specifically define the VOC "hot spots" at the site. Thus, closer scrutiny of the data reveals that EPA has identified an area of only about 1,700 square meters as associated with the higher VOC levels on site. The area of the emission source used by EPA is, therefore, more than seven times larger than the VOC "hot spot" area identified by site data.

Moreover, the EA assumes continual exposure to ambient air at the site for a 70-year lifetime. Any residents of the site would have to remain outside and breathe every breath from birth in the vicinity of the highest VOC levels found at the site to achieve such an exposure. This assumption is obviously unrealistic, particularly in view of the fact that site residents currently are being relocated, EPA has recommended permanent relocation of all residents, and the Town of Springfield has enacted a municipal ordinance authorizing restrictions on future site development.

Also, as discussed above with respect to contaminant migration to the bedrock aquifer, EPA's calculations underestimate the organic carbon content of the waste materials on site, thereby overstating the flux rate of VOCs from soil to air. EPA has recognized this fact in Appendix A-11 to the FS which states that "[i]f additional organic matter is present in the form of paper and other municipal waste co-disposed with the chemical wastes, then the actual vapor density may be lower." (Emphasis added.) In calculating organic carbon content in disregard of the fact that municipal waste was co-disposed with industrial waste, EPA has grossly overestimated the amount of contaminant migration through landfill gases.[4]

Although EPA's calculations cannot be replicated in the absence of certain critical inputs utilized by EPA which do not appear in the EA, Remcor has performed a simple mass balance calculation using the "box model" set forth in the EA at Appendix C. Remcor's calculations show that, under EPA's model, the contaminants of concern would be exhausted in a matter of hours (and obviously could not contribute to the lifetime exposure risk postulated by EPA). It is apparent that the emission rates assumed by EPA in modelling the migration of contaminants in landfill gases at the site are much too high.

Finally, EPA's calculations regarding air emissions are based on the occurrence in surface soils of two contaminants, chloroform and benzene. EPA's calculations assume that the maximum concentrations of chloroform (380 micrograms per kilogram) and benzene (5,600 micrograms per kilogram) are present over a three acre area. This assumption might be warranted if additional site data were unavailable. In reality, however, the levels used by EPA were found only at boring SO-10 (chloroform) and boring 60-001 (benzene). Chloroform was detected in only four other surface soil samples (range: 4 to 95 micrograms per kilogram) and two sub-surface soil samples (2 and 4 micrograms per kilogram). Benzene was detected in four other surface soil samples (range: 2 to 40 micrograms per kilogram) and one sub-surface soil sample (1 microgram per kilogram). Therefore, the maximum levels are not representative of site-wide contamination, and do not represent average case or "plausible" maximum case scenarios. Redefinition of the emission source area, based on actual data and realistic exposure assumptions, would result in a finding that the cap proposed by EPA is not necessary to mitigate inhalation risks.

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[4] The administrative record does not contain flux rate calculations or data that would enable us to determine how EPA performed those calculations. In this respect, EPA has violated the Administrative Procedure Act, 5 U.S.C. 551 *et seq.*, and Section 117 of CERCLA. Our comments on the overstatement of flux rates are based on the relationship between flux rates and fraction of organic carbon, which is disclosed in the record. As noted above, however, the location of soil samples from which FOC was calculated is not disclosed in the administrative record.

C. EPA's Calculations Concerning Contaminant Exposure Through Consumption Of Fish From The Black River Are Erroneous

A third exposure route addressed in the FS (and a secondary rationale for the target cleanup levels for soils) is the ingestion of contaminants through the consumption of fish from the Black River. The EA concludes that there is a present risk to persons consuming fish from the Black River, due to assumed PCB concentrations in such fish. FS at 1-43, Table 1-8. Clearly, this is erroneous because sampling of fish from the Black River in 1986 found no evidence of PCBs. See Summary Report, NUS Corporation at 4-39 (September, 1986). EPA acknowledges that PCBs were not detected during the 1986 sampling, but fails to explain how this fact is consistent with its determination that there is a present risk to persons consuming Black River fish. See EA at 4-15.

The EA also concludes that consumption of fish from the Black River presents a future risk through ingestion of PCBs. The EA assumes through modeling that PCBs leach from the landfilled wastes into the shallow groundwater, that they migrate into the bedrock groundwater in the same concentrations as modeled in the shallow groundwater, and that they are then carried by bedrock groundwater to Black River sediments where they may be subject to uptake by the fish. EPA's assumptions and calculations in this regard are in error.

By factoring in the effects of dilution and attenuation, Remcor calculated that the actual concentrations of PCBs in bedrock groundwater would be 1/10,000,000th of that assumed by EPA. See Table 3 of Remcor comments. The actual site data confirm that EPA's calculations are flawed, in that no PCBs have been detected in bedrock monitoring wells east of the landfill. Moreover, the fish tissue concentrations of PCBs modeled from EPA's erroneous groundwater values and based on a bioconcentration factor of 1,000 are 0.0005 micrograms per gram and 0.03 micrograms per gram for the average and plausible maximum cases. As stated on page 4-5 of the EA, these concentrations are at least two orders of magnitude (100 times) lower than the national background level and Food and Drug Administration acceptable level of two micrograms per gram.

The errors in the leach model are exacerbated by EPA's exposure scenario, which assumes consumption of 6.5 grams of fish per day over a 70-year lifetime. This exposure scenario is unrealistic in that it assumes that the entire lifetime diet of fish for the exposed population comes from the Black River.

In addition to using a flawed leach model and unrealistic exposure assumptions, the Agency failed to correctly calculate the impact of infiltration through the wastes on the bedrock aquifer. For the reasons discussed above, PCB concentrations in bedrock groundwater will not be equal to the modeled concentration in the shallow aquifer.

EPA's assumptions regarding the migration of PCBs are inconsistent with its findings in prior cases, such as the Cannons Engineering site in Bridgewater, Massachusetts, that "[d]ue to the chemical nature of the PCB compound, they are very immobile in soil and do not migrate in groundwater [and] do not pose a threat to ground water."

If EPA had properly calculated potential PCB concentrations in bedrock groundwater, it would have determined that the future risk due to ingestion of fish in the Black River is far less than 1 x 10^{-7} (i.e., one additional cancer in an exposed population of ten million people), the target risk level used by EPA. Finally, even accepting all of EPA's incorrect calculations and assumptions and unrealistic exposure scenarios, the maximum future risk identified in the EA is 6 x 10^{-6} (six additional cancer cases in an exposed population of one million persons), which is well within EPA's accepted range of 1 x 10^{-4} to 1 x 10^{-7} (one excess cancer in ten thousand population to one excess cancer in ten million population). This risk does not justify the capping proposed by EPA.

D. The Selection of Target Clean-up Levels Based On 10^{-7} Incremental Cancer Risk Is Unsupported By Site Characteristics

In developing target cleanup levels for soils at the Old Springfield Landfill Site, EPA utilized erroneous assumptions concerning contaminant migration into the bedrock aquifer and through landfill gases, and back-calculated target cleanup levels in soils to determine which soils should be excavated and/or capped. As noted above, the contaminant migration "models" used by EPA are not defensible and do not accurately reflect site conditions.

To further compound these errors, EPA adopted a carcinogenic risk level of 10^{-7} (i.e., one additional case of cancer in an exposed population of 10,000,000 people) to derive the target cleanup levels in soils. This results in cleanup levels which, to our knowledge, are unprecedented in application to cleanup of a municipal landfill.

EPA has failed to explain its rationale for adopting 10^{-7} as the target risk level for the site. As stated in

EPA's Superfund Public Health Evaluation Manual, EPA/540/1-86/060 (October 1986), "[a]ccording to Agency policy, the target total individual carcinogenic risk resulting from exposures at a Superfund site may range anywhere between 10^{-4} to 10^{-7}." Id. at 91-93. See also 52 Fed Reg. 32496, 32499 (1987) ("Cleanup levels should be selected such that the total risk of all contaminants falls within the acceptable risk range of 10^{-4} to 10^{-7}.") In fact, EPA has drafted and widely disseminated suggested revisions to the National Contingency Plan (the regulations governing Superfund clean-ups) which provide that site cleanups should address a risk level of 10^{-6}.

The Office of Technology Assessment of the Congress of the United States has cited with approval the fact that the target level most frequently used by EPA is 10^{-6} (one excess cancer in an exposed population of 1,000,000). See Are We Cleaning Up? 10 Superfund Case Studies (June 20, 1988). This is borne out by our review of the Records of Decision issued by EPA Region I in the last several years. The Region selected a target level of 10^{-6} at the Auburn Road site in Londonderry, New Hampshire, the Baird and McGuire site in Holbrook, Massachusetts, and the Cannons Engineering Corporation site in Bridgewater, Massachusetts; and a less stringent target level of 10^{-5} at the Keefe Environmental Services site in Epping, New Hampshire. We are not aware of any sites where EPA Region I (or any other EPA Region) has selected the most stringent target level of 10^{-7}.

Even if EPA has, on occasion, used a 10^{-7} target level, application of that risk level to cleanup of the Old Springfield Landfill Site is unwarranted because of site-specific characteristics. First, there is no current use of bedrock groundwater at or downgradient of the site, and no likelihood that it will serve as a potable supply in the future. Second, the Town of Springfield has enacted Ordinance No. 88-2 to preclude development in the future of any contaminated bedrock groundwater as a potable supply. Third, there are no bedrock groundwater wells presently located between the former landfill and the Black River, and the potential for future development of this area is severely constrained by topography. Fourth, a municipal water supply is already available as an alternative to use of bedrock groundwater. Finally, all residents of the mobile home park are being relocated, and Springfield Ordinance No. 88-2 authorizes restrictions on future site development. EPA has considered less dramatic site specific factors at other sites.[5]

As EPA has itself recognized, the use of a 10^{-7} carcinogenic risk level for all media and exposure scenarios at the Old Springfield Landfill site results in target soil cleanup levels which are far below the limits of analytical detection, requiring remediation of any area demonstrating detectable contaminants of concern. See FS at 3-31 and 3-52. In fact, the natural background level of polynuclear aromatic hydrocarbons ("PAH's") in forest soils is 555 times greater than the target cleanup level selected by EPA. FS at 3-19. Moreover, "[a]lmost all of the soil target levels calculated based on a total carcinogenic target risk of 10^{-7} . . . were within the range for forest soils." Id. And the PCB soil cleanup target level selected by EPA for this site is 1,800,000 times lower than the level selected by EPA five months ago for the Cannons Engineering Corporation site in Bridgewater, Massachusetts. See Record of Decision, Cannons Engineering Corporation Site, Bridgewater, Massachusetts (March 31, 1988). In sum, it is clear that a risk assessment which calls for remediation of contamination at "any location where a contaminant of concern was detected," regardless of background levels, is one that has gone grossly awry.

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[5] For example, at the Cannons Engineering Corporation site in Bridgewater, Massachusetts, EPA considered the low probability of residential development and the availability of a municipal water supply as significant factors in deciding upon the scope of cleanup.

II. COMMENTS ON CAP AS COMPONENT OF PREFERRED ALTERNATIVE

A. The Data Do Not Support The Need For The Cap Proposed By EPA

The preferred remedial alternative proposed by EPA provides for installation of a multi-layer cap on the approximately eight acres of the Old Springfield Landfill site which are associated with past landfilling activities. EPA's determination that an 8-acre low permeability cap is needed at the site is based on its conclusion that the site presents unacceptable risks of ingestion of bedrock groundwater, ingestion of fish from the Black River, and inhalation of landfill gases. According to the Agency's reasoning, the proposed cap (together with a gas collection and venting system) will mitigate air risks and minimize rainfall infiltration to prevent leaching of the landfilled wastes into the shallow groundwater and ultimately into the bedrock aquifer.

As discussed above and documented more extensively in the attached comments prepared by Remcor, it is clear that the site data do not support the need for such a cap. The calculations in the RI regarding the migration of contaminants from waste materials to shallow groundwater overestimate contaminant levels, largely due to an inappropriately low FOC value. In addition, EPA's infiltration modeling overstates the recharge to bedrock from vertical infiltration and fails to take into account dilution and attenuation. For these and the other reasons set forth above, EPA's data do not demonstrate an unacceptable risk through ingestion of bedrock groundwater or consumption of fish from the Black River.

Moreover, as set forth above and in the attached Remcor comments, EPA overstated the risks associated with inhalation of landfill gases. Among other errors, the Agency used an inappropriate FOC value, unwarranted exposure assumptions, and unsupported source area and maximum contaminant values. The data do not show an unacceptable risk associated with inhalation of landfill gases.

The only exposure pathways meriting remediation based on EPA's data are those associated with contaminated seeps and with direct contact with contaminated surface soils. The risks of direct contact with contaminated surface soils can and should be eliminated by placement of a soil cover over approximately two acres on the eastern portion of the site. Any risks posed by exposure to contaminated seeps can and should be addressed by seep collection and treatment.

B. The Steep Outslope Areas Should Not Be Capped

As set forth above, EPA has no data justifying construction of a low permeability cap over approximately eight acres of the site. This is particularly evident with respect to the steep outslopes along the eastern periphery of the waste disposal areas. EPA has no site data documenting the presence of hazardous substances in these areas. In addition, even if it is assumed that hazardous substances are present in these areas, the overall benefits of capping the outslopes are outweighed by construction risks, implementation problems, aesthetic considerations, and costs.

The Agency has failed to document the presence of hazardous substances in the outslope areas. Apparently because of the steep topography, drilling and sampling were not performed in these areas. Proposed capping, therefore, is based on an assumption that these areas contain hazardous substances and that the concentrations of such substances exceed modeled risk-based cleanup levels.

Moreover, site data suggest that the contribution of the outslope areas to recharge of the bedrock aquifer is minimal. As discussed in the attached comments by Remcor, the steepness of the landfill outslopes promotes run-off of surface water and the dewatering of the slopes through seepage. Surface water runoff is not considered to be a significant transport mechanism on the outslope areas. RI at 157. Remcor's calculations indicate that bedrock recharge from water infiltrating through the slope areas proposed for capping is, at a maximum, 3% of the total recharge into the bedrock aquifer underlying the eastern portion of the site. Attenuation of the contaminants flowing through the till would further reduce the impacts of this recharge. Thus, any benefits from construction of a low permeability cap on the slopes are negligible.

In addition, EPA has not adequately considered the "constructibility" problems associated with capping the outslope areas. Remcor has reviewed relevant literature which indicates that the friction angle (i.e., the maximum angle at which frictional forces will impart resistance to sliding between a high-density polyethylene membrane and sand materials) is 17 to 18 degrees. According to the literature, a grade of approximately four to one, as opposed to EPA's suggested three to one, would be required to achieve mass stability and to prevent liner failure. Achieving such grades would require excavation and relocation of about 47,000 cubic yards of material, as opposed to the approximately 19,000 cubic yards estimated by EPA, to achieve an overall grade of three to one. See FS, Table 7-4.

Also, the heterogeneous nature of the municipal solid waste within these outslopes would present significant difficulties in the handling of materials and compacting the graded slopes to allow placement of the cap. The outslopes are presently at or near the angle of repose of the materials, the wastes having been dumped into place in the existing ravines. These slopes are prone to landslides that would create an ongoing maintenance problem and would generally reduce the effectiveness of the cap. Beyond that, there are a number of potential hazards associated with the large scale excavation that would be required, including the volatilization of organics. The impacts and costs associated with excavating and capping the outslope areas are far greater than those assumed by EPA.

Finally, the residents of the Springfield area have expressed concerns about aesthetic considerations associated with EPA's preferred remedial alternative. The eastern outslopes presently comprise approximately five to seven acres of heavily wooded terrain. Excavation and capping of the outslopes would involve the loss of approximately two acres of forest, in addition to that which would be lost through EPA's proposed seep collection system.

In view of the lack of data concerning hazardous substances in the eastern outslopes, the instability of the slopes, the difficulties, risks and costs associated with capping, and the minimal impact of infiltration passing through these areas, the eastern outslopes should not be capped. However, the contaminated seep discharges on the eastern outslopes can and should be collected and treated.

C. If The Selected Remedy Includes A Low Permeability Cap, The ROD Should Specify Performance Standards Rather Than Detailed Cap Configuration

The FS and Preferred Alternative specify a detailed cap configuration consisting of a vegetative cover over twelve inches of topsoil over twelve inches of clean fill over a filter fabric over a drainage layer over a synthetic membrane over two feet of compacted glacial till over a six inch gas collection layer bounded by filter fabric. Contrary to statements made by EPA employees and consultants at several public meetings, this specific design is not required by the Resource Conservation and Recovery Act ("RCRA") or by EPA regulations under RCRA or Superfund. Rather, EPA regulations at 40 C.F.R. § 264.310 set forth performance standards which specify that a landfill cover must be designed and constructed to

(1) provide long-term minimization of migration of liquids through the closed landfill;

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(2) function with minimum maintenance;

(3) promote drainage and minimize erosion or abrasion of the cover;

(4) accommodate settling and subsidence so that the cover's integrity is maintained; and

(5) have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

Because these performance standards can be met, and because protection equivalent to the cap proposed by EPA can be achieved, with a less complex cap, the ROD should specify performance standards, including, perhaps, a permeability target such as 10^{-7}. Actual cap configuration should be determined during the remedial design phase of the project. Provision for flexibility in cap design may accommodate the concerns of area residents that aesthetic considerations be taken into account and that the cap be as close to grade as possible.

In addition to the foregoing reasons for flexibility in design, it appears that EPA's preference for a synthetic membrane cap is inappropriate at this site given that it is a former municipal solid waste landfill and also given the steep slopes on the eastern portion of the site. As evidenced by continuing methane emissions, degradation of the wastes is ongoing, and will create differential settlement. In such a situation, a cap consisting of natural materials is preferable to one containing synthetic membranes, which have a tendency to tear. Moreover, as noted above, construction of a synthetic membrane cap over the outslope areas would require that the slopes be reduced to a grade of 4 to 1 or less. This would require the excavation of approximately 47,000 cubic yards of waste, with their redeposition on the surface of the plateau.

Based on the considerations discussed above, a cap consisting of different materials and in a different configuration may prove more reliable and acceptable to the community than the synthetic membrane cap proposed by EPA. Such an evaluation should be performed during remedial design.

III. COMMENTS ON COLLECTION AND TREATMENT OF CONTAMINATED SEEPS

A. The Seep Collection System Should Be Designed During The Design Phase Of The Project, Following Issuance Of The ROD

Seep collection and treatment was proposed by us on June 8, 1988, and we urge the implementation of appropriate measures without undue delay. As discussed in the attached document, however, we have a number of questions and concerns about the seep collection system proposed by EPA. For example, EPA proposes to collect all ten seeps identified on the eastern outslopes of the plateau, despite the fact that site-related contaminants have been detected in leachate in only three of these seeps. The ROD should provide for collection of only those seeps which EPA has determined are contaminated, with provision for monitoring the remaining seeps periodically. The seep collection system could be designed to allow for modification to accommodate collection of any additional seeps which may become contaminated.

In addition, as explained in the Remcor comments, there may be other seep collection designs which provide a greater degree of safety vis-a-vis the stability of the slope areas. Also, other designs may have lesser negative aesthetic impacts, which are of concern to the community. For example, the seep collection system proposed by EPA would require the clear-cutting of several acres of woodlands on the outslope areas. The alternative design proposed by us on June 8, 1988, would entail clearing of only those areas in the immediate vicinity of the seeps to be collected and immediately adjacent to the main collection line. Thus, the ROD should specify the seeps to be collected, but provide for design of the seep collection system during implementation of the remedial action.

B. The Treatment Plant Should Be Designed During The Design Phase Of The Project, Following Issuance Of The ROD

All parties seem to agree that treatment of the collected seeps and leachate at the Town of Springfield's publicly operated treatment works is preferable to the EPA proposal for on-site treatment and discharge directly to surface waters. Although all of the issues pertaining to treatment at the Town's treatment works have not been finally resolved, these details are more appropriately addressed through design studies during implementation of the ROD. The

ROD need only specify the level of treatment required, either on-site or at the Town treatment works.

In addition, there are a number of components of the treatment plant proposed in the preferred alternative that may not be necessary to accomplish the level of treatment desired by EPA. For example, there may be no need for an oil/water separator, or for the degree of metals precipitation proposed by EPA, to satisfy treatment standards. These issues are best resolved through treatability studies conducted after the ROD.

Finally, deferring a decision on the location of treatment may allow full consideration of the aesthetic concerns raised by the local residents. Although our June 8, 1988 submission contemplated on-site pretreatment facilities similar to the on-site system proposed by EPA, after hearing the residents' aesthetic concerns, we have begun to explore other alternatives. It may be possible to locate the treatment plant adjacent to the Town's existing treatment works. The ROD should be flexible enough to allow this desirable result.

IV. COMMENTS ON GROUNDWATER PUMPING AND TREATING

As explained in more detail in the Remcor comments, the data defining the sand and gravel aquifer and its role with respect to contamination of the western leachate seeps are not sufficient at this time to provide the basis for installation of groundwater interceptor wells in the area east of Will Dean Road. In addition, Remcor believes that characterization of the hydrogeologic regime in the vicinity of the sand and gravel zone is not adequate to permit design and implementation of the proposed interception system. Accordingly, the number, location and depth of any groundwater interceptor wells in this zone should be determined through design studies during implementation of the ROD, rather than specified in the ROD.

V. COMMENTS ON SLURRY WALL AS POSSIBLE COMPONENT OF THE REMEDY

Although not adopted as part of EPA's "preferred remedial alternative," Alternative SC-2 of the FS includes reference to an optional slurry wall which would enclose the capped waste areas on the north, west and south. The stated purpose for the possible inclusion of a slurry wall as a component of the remedy would be to restrict lateral flow of groundwater from upgradient areas through the wastes. FS at p. 5-12.

We see no reason for further consideration of a slurry wall in view of the statements made by EPA employees and consultants during the public meetings and hearings in June and July of 1988. For example, an EPA employee stated that the Agency could not find a way to cut off lateral flow and that most water contacting the waste comes from the vertical (precipitation) and not from subsurface flow. The project manager for EPA's consulting firm stated that very little water flowing from the upgradient areas actually comes into contact with the landfilled wastes, and concluded that there is "no scientific reason to try to put in a slurry wall that is not implementable."

VI. CONCLUSION

The data provided by EPA show that the risks posed by the Old Springfield Landfill are associated with the seeps and with direct contact with contaminated surface soils in a two acre area to the east of the site. These risks are addressed by the proposal submitted by Emhart, Textron, and the Town of Springfield on June 8, 1988. We remain willing and ready to implement remedial measures along the lines we proposed, as modified by these comments. In addition, we believe that continued discussions among the interested parties can bring about a mutually satisfactory approach to site remediation.

REMCOR

COR, Inc. • 701 Alpha Drive • P.O. Box 38310 • Pittsburgh, PA 15238-6310 • 412-963-1106

August 23, 1988

Project No. 88530.9

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ME & VT WASTE
MANAGEMENT BRANCH

Ms. Paula Fitzsimmons
Regional Project Manager
U.S. Environmental Protection
Agency, Region I
Waste Management Division
90 Canal Street (HPS-1) - 2nd Floor
Boston, Massachusetts 02114

Technical Comments
Draft Final Project Documents
and Preferred Remedial Alternative
Old Springfield Landfill Site
Springfield, Vermont

Dear Ms. Fitzsimmons:

On behalf of Emhart Corporation (Emhart), Textron Inc. (Textron), and the Town of Springfield (Springfield), Remcor, Inc. (Remcor) has performed a technical review of the draft final project documents relative to the remedial investigation/feasibility study (RI/FS) at the Old Springfield Landfill (Old Springfield) site. We have also evaluated the preferred remedial action publicly announced by the U.S. Environmental Protection Agency (EPA). Documents reviewed included the following:

- Draft Final Supplemental Remedial Investigation Report (RI)
- Draft Final Endangerment Assessment (EA)
- Draft Final Feasibility Study Report (FS).

This letter presents technical comments to be made part of the Administrative Record for this site.

INTRODUCTION

OVERVIEW OF EPA SITE CHARACTERIZATION AND PREFERRED ALTERNATIVE

The Old Springfield site is a former municipal and industrial waste landfill situated on a plateau overlooking the Black River and Seaver's Brook south of the commercial center of Springfield, Vermont. Co-disposal of municipal solid waste (MSW) and industrial wastes reportedly occurred at this former landfill from about 1947 until 1968. A mobile home park has occupied the more northern and central portions of the plateau since 1970.

Through remedial investigations initiated in 1984, the EPA has identified three areas of landfilled waste disposal on the eastern portion of the plateau, comprising a total of approximately eight acres. The EPA concludes in the FS that contaminant migration from these wastes is occurring via leaching of contaminants into ground water and through landfill gas emissions, and that contaminated soils are accessible for residents to be exposed via direct contact (FS Table 1-6).

In establishing objectives for cleanup at the Old Springfield site, the EPA defined a target risk level for carcinogenic substances of 10^{-7} (one additional case of cancer attributable to lifetime exposure in a population of 10,000,000, or a 1/10,000,000 additional chance of a single individual in that population contracting cancer) (FS, page 3-1). Risks estimated in the EA are considered unacceptable (i.e., requiring remedial action) if they exceed the 10^{-7} level.

Current and future estimated risks are summarized in FS Tables 1-7 through 1-10. Current unacceptable risks were attributed by the EPA to the following:

- On-Site Risks:
  - Direct contact with soils
  - Inhalation of chemicals in landfill gas
- Off-Site Risks:
  - Inhalation of landfill gas
  - Ingestion of fish from the Black River
  - Inhalation of volatile organic compounds (VOCs) emitted from the western leachate seeps.

Future unacceptable risks estimated by the EPA are the following:

- On-Site Risks:
  - Direct contact with soils
  - Inhalation of chemicals in landfill gas
  - Ingestion of bedrock ground water in areas east of the landfill
- Off-Site Risks:
  - Ingestion of fish from the Black River
  - Ingestion of bedrock ground water in areas west of the site.

The EPA's preferred alternative contains a number of elements. To address future risks associated with ingestion of bedrock ground water east of the former landfill, the EPA has concluded that all soils at the site exhibiting any detectable levels of contaminants of concern must be remediated (FS, page 3-52). The EPA's preferred alternative provides for capping of these soils with a low-permeability cap over an area of approximately eight acres in the eastern portion of the site, generally encompassing the former landfill area. In addition, approximately 6,000 cubic yards (yd^3) of "waste" beyond the limits of the proposed cap would require excavation and consolidation under the cap. According to the EPA, capping of the outslopes of the former landfill would require excavation and relocation of about 19,000 yd^3 of the landfill.

The EPA's preferred alternative includes installation of interceptor wells into a sand and gravel water-bearing zone lying between the glacial till and bedrock in the western portion of the plateau. The objective of these wells is to intercept contaminants prior to their discharge at the western seeps and ultimate entry into the bedrock aquifer. The EPA postulates that the sand and gravel zone trends to the northwest from the former landfill area and acts as a "drain" for both till and bedrock in this area due to its much higher hydraulic conductivity (estimated to be approximately two orders of magnitude greater than either the till or bedrock [RI, page 94]). This zone is said to provide a conduit for migration of contaminants to the western leachate seeps (RI, page 97).

The EPA's preferred remedial alternative also proposes continuous leachate collection for 10 leachate seeps identified on the eastern outslopes of the plateau and 4 seeps identified in the western leachate seep area. Following conveyance to an on-site treatment unit, the treated leachate (and ground water drawn from the sand and gravel zone) would be discharged directly to an "eastern slope surface drainage course" (FS, page 6-19).

Control of site access would be provided by a security fence following permanent relocation of the residents of the mobile home park.

OVERVIEW OF TECHNICAL COMMENTS

Selection of Target Risk Level

The EPA's selection of the 10^{-7} incremental cancer risk as the target risk level at the Old Springfield site for all media and exposure pathways is without precedent as reflected in recent records of decision (RODs) at other sites in EPA Region I and does not reflect site characteristics in the current instance that mitigate potential risk. The target risk level typically employed in recent EPA Region I RODs is 10^{-6}; this level is appropriate at the Old Springfield site.

The data presented in the RI do not support the presence of current risks associated with inhalation of landfill gases or ingestion of fish. Even ignoring the technical justification for EPA's risk calculations, all current unacceptable risks postulated by the EPA can be mitigated by controlling access to the landfill and the western leachate seeps and by restricting fishing in the Black River.

Apart from selection of an inappropriate target risk level, the EPA's analysis of specific risk pathways is lacking. According to the EPA, the primary contaminant migration pathway of concern at this site is ground water. The EPA relied heavily on conceptual models to evaluate hydrogeologic conditions and to examine the anticipated extent of contamination in ground water (and other media, as well). In the absence of empirical data, a number of the assumptions made by the EPA as input to these models were unrealistic or in error, leading to overstatement of the actual exposure point concentrations and risks.

For example, based on a modeled future potential risk associated with ingestion of bedrock ground water east of the landfill, the EPA has established soil cleanup levels very much below the limits of analytical detection (FS Table 3-18). In recognition of this, the EPA ultimately established the analytical detection limits (i.e., the lowest concentrations that can be measured by standard analytical methods and instrumentation) for the contaminants of concern as the target cleanup standards for soils (FS, page 3-52). Implementation of these standards leads to the proposed capping of the entire eight-acre former landfill. The data, however, do not support the need for such capping to protect bedrock ground water east of the former landfill.

The EPA employs an organic leaching model to predict contaminant concentrations in the shallow aquifer as a result of leaching of wastes by infiltrating surface water. This model fails to account for the capacity of the MSW to retard leaching of organic contaminants into the ground water. In addition, the EPA assumes (in the absence of empirical data) that concentrations of contaminants in the bedrock aquifer east of the landfill will eventually equal those found in the shallow aquifer under "steady-state" conditions. This approach does not consider the relative contribution of infiltration through the waste materials to the total bedrock ground water flow toward the Black River. It also does not reflect the role of other processes such as dispersion within the aquifer and adsorption in the till between the wastes and the bedrock aquifer in reducing the concentrations of contaminants in bedrock ground water. If the "steady-state" model correctly predicted bedrock aquifer contamination, nearby bedrock wells would evidence contamination. In fact, contamination has not been detected in bedrock wells less than 400 feet east of the landfill (Monitoring Wells 20 and 20D, RI Table 4-10) more than 40 years after wastes were disposed. The fact that eastern leachate seeps do not evidence the levels of contamination found in shallow eastern monitoring wells (RI Tables 4-10 and 4-13) indicates that attenuative processes are operative within the landfilled wastes and cannot be ignored in modeling leaching of contaminants from the wastes.

The EPA also utilizes the leaching model and "steady-state" model to predict concentrations of polychlorinated biphenyls (PCBs) in eastern bedrock ground water discharging to the Black River. PCBs are generally not mobile in ground water because of their extremely low solubility. The EPA acknowledges this fact in its initial screening of remedial technologies (FS Table 4-3), stating that "PCBs are not a major concern in water at the site." Notwithstanding this statement, the EPA considered PCBs of concern in evaluating the potential for bioaccumulation of site contaminants in fish within the Black River. By appropriately correcting for the retention of PCBs in the MSW/soil matrix, however, and correctly applying a dilution factor to account for the actual contribution of infiltration through the waste areas to bedrock ground water discharging to the Black River, it is apparent that the concentrations of PCBs that may reach the Black River from the site are not sufficient to produce concentrations of PCBs in fish tissue that would pose a health risk.

Estimation of Risks from Inhalation of Landfill Gas

The second risk-based factor driving the proposed capping is the protection of residents from inhalation of chemicals stripped from the wastes by landfill gas (predominantly methane). In the absence of empirical data, the EPA utilized an emissions model to simulate concentrations of chemicals in air on site, and, again, failed to reflect the capacity of the MSW to retard the migration of contaminants into air. In addition, EPA's current-use exposure scenarios are unrealistic, assuming that residents on-site would breathe air containing the highest levels of contaminants continually for an entire lifetime (i.e., 70 years), and not considering that these residents will be relocated as part of the preferred alternative. The risk to the closest off-site residents along Will Dean Road was assumed to be the same as that for those living on the site, neglecting the dispersion of contaminants from the former landfill to Will Dean Road, a distance of over 700 feet.

Most importantly, the EPA emissions model so overestimates airborne concentrations that, on a mass-balance basis, the EPA model would result in the emission source becoming exhausted in about three days. In reality, chemicals are not emitted in landfill gases at levels sufficient to pose any unacceptable current or potential future risk to local residents and do not require remedial action at the Old Springfield site.

Capping of Steep Outslopes of the Former Landfill

The EPA preferred alternative includes capping of the steep outslopes of the former landfill areas. Not only would significant difficulties be encountered in constructing and maintaining a cap on these outslopes, but the realized benefit in reducing infiltration to bedrock ground water would be insignificant.

MSW was dumped in ravines along the eastern portion of the plateau, and currently rests at its approximate angle of repose (i.e., the maximum stable slope). Degradation of MSW in the former landfill is an ongoing process, resulting in differential settlement and instability, particularly evident in the outslope areas (FS, page 1-14). The steep outslopes of the former landfill would require significant regrading and slope reduction to achieve grades suitable for capping. After installation, the maintenance of an effective cap on the regraded outslopes would be complicated by the inherent instability of this area.

Besides the engineering difficulties, the outslope areas were not sampled in the RI and there are no empirical data to indicate that capping of these areas is required to protect bedrock ground water. The steepness of the outslopes encourages runoff of surface water, and their proximity to springs and seeps (i.e., points at which infiltrating surface water would return to the ground surface) indicates that nearly all of the infiltration into the outslopes would emerge at these points.

Excavation of Areas Beyond the Proposed Cap

In addition to capping the former landfill, the EPA's preferred alternative includes excavation of about 6,000 yd^3 of "waste" presently lying beyond the limits of the proposed cap. These satellite areas are identified in Exhibit 3 of the EPA's Proposed Cleanup Plan for the Old Springfield Site (June 1988) in the northeastern and northwestern portions of the plateau. The northeastern area has also been identified as Waste Area 1 in RI Figure 3-4. These materials would be relocated under the cap to prevent surface water infiltration and emanation of chemicals to the air via landfill gas emissions.

The current RI data do not support remediation at either of these two satellite areas to mitigate infiltration of contaminants to the bedrock aquifer. Analytical data from Waste Area 1 are inconclusive in identifying the presence of chloroform as the single volatile organic compound (VOC) of concern relative to degradation of ground water quality. Boring No. 7 encountered minor amounts of metal, wood, and plastic mixed with sand in this area, more typical of construction debris than industrial waste (RI Table 3-4). The northwestern area is defined by Surface Soil Sample OSS-2, which encountered only three polynuclear aromatic hydrocarbons (PAHs) near the surface at the limit of analytical detection (RI Table 3-5). The postulated current and future risks via inhalation of chemicals released to the air are negligible. EPA's use of an unrealistically low measure of retention of hazardous substances by the MSW/soil matrix, and its overestimation of the rate at which hazardous substances are evolved from the wastes resulted in a significant overstatement of inhalation risk. Therefore, no basis exists for excavation and relocation of these materials. The presence of a soil contact risk driven by the PAHs at the northwestern area is based on the finding of contaminants at the limit of analytical detection. This, alone, is an inadequate basis for remedial action.

Design of the Proposed Cap

Even if a low-permeability cap would be justified to remediate the former landfill, the cap configuration specified by the EPA is unwarranted. The cap design defined in the EPA's preferred alternative is a multi-layer system incorporating a basal gas collection layer and a hydraulic barrier consisting of a 40-mil flexible membrane liner over two feet of compacted glacial till (FS Figure 4-1). Alternative cap designs may be implemented to achieve the objectives of restricting infiltration of surface water and controlling landfill gas emissions on portions of the former landfill as required to mitigate any postulated risk. It is preferable to specify performance requirements for the cap, if any, in the ROD, and to leave cap design specifications to remedial design to maximize implementability and cost-effectiveness.

Collection of Leachate Seeps

The EPA proposes to provide a continuous leachate collection trench along the eastern outslopes at the approximate elevation of the current springs and seeps. This collection trench cannot be constructed according to the EPA design, given the steepness of the outslopes and their inherent instability. In addition, not all springs along the outslope have evidenced contamination. Instead, the collector for the seeps should be installed along an existing bench at the foot of the slope. Those seeps exhibiting site-related contamination would then be collected via french drains at their point of emanation with flow conveyed downslope to the main collector and to a treatment system prior to discharge. This approach would provide an equivalent degree of collection without the attendant problems of maintaining the collection trench on the steep outslopes. Disturbance of established vegetation would be minimized and the present aesthetics of the eastern outslopes of the plateau would be preserved.

Interceptor Wells on the Western Portion of the Plateau

The EPA believes that contamination is migrating in ground water to the northwest via a sand and gravel water-bearing zone, possibly a buried stream valley (RI, page 94; FS, page 1-9). The sand and gravel zone is believed to act as a "drain" for ground water within both the till and bedrock on the western portion of the plateau. According to the EPA, this drain encourages migration of ground water from the former landfill in the southeastern portion of the site toward the northwest, which then discharges in the western leachate seep area. RI analytical data from

Monitoring Well 29D have confirmed that the ground water within this zone is contaminated (RI Table 4-12). The preferred alternative anticipates installing interceptor wells into this water-bearing zone to capture contaminants before they migrate to the western leachate seeps. The sand and gravel zone is poorly defined at present, and its role in ground water and contaminant movement is not well understood. Implementation of any ground water interception action should be preceded by the necessary predesign studies following finalization of the ROD.

Leachate and Ground Water Treatment and Discharge

The preferred alternative anticipates collection of the western leachate seeps via a single french drain in this area, with conveyance to a central treatment facility prior to discharge. Treated leachate collected from eastern and western leachate seeps (as well as from the interceptor wells) would be discharged directly to a surface drainage on the eastern outslope. It would be preferable to pretreat the leachate with discharge to the Springfield publicly owned treatment works (POTW). As an alternative to the central treatment facility, the treatment facility may be constructed immediately adjacent to the POTW. Several residents have expressed a concern regarding the aesthetic impacts of on-site treatment and direct discharge, as proposed by the EPA. Discharge through the POTW would provide an added measure of safety to avoid discharge of untreated leachate in the event of failure of the on-site treatment system.

Optional Slurry Wall

The EPA is presently considering placement of a slurry wall around three sides of the proposed cap area. The intent of the wall would be to divert shallow, upgradient ground water flow around the wastes, thereby reducing the potential for ground water flushing of the wastes. The RI indicates that the water table lies below the elevation of the deltaic sands (the uppermost stratum at the site) and that lateral ground water movement in the underlying till zone is limited, probably occurring via interconnected zones of higher permeability (e.g., sand stringers) within the till (RI, pages 91 to 100). In accordance with EPA's conceptual model of ground water flow (RI Figure 4-9), the sand and gravel zone directly overlying bedrock and underlying the till in the western portion of the plateau may create a strong hydraulic gradient away from the landfilled wastes. This gradient would limit the potential for uncontaminated upgradient ground water to contact the wastes. Accordingly, the data provided in the RI do not demonstrate that a slurry wall is necessary to divert upgradient ground water around the wastes on the outslope areas that lie below the water table. Based on current data relative to the location of the wastes and ground water movement, a slurry wall would have limited value and should not be constructed.

DETAILED DISCUSSION OF TECHNICAL COMMENTS

Comments discussed in the preceding overview are amplified in this section. Following each stated comment, the necessary background and detailed technical basis are presented.

COMMENT NO. 1: THE SELECTION OF THE 10^{-7} INCREMENTAL CANCER RISK AS THE TARGET RISK LEVEL DOES NOT APPROPRIATELY REFLECT SITE CHARACTERISTICS AND IS NOT CONSISTENT WITH RECENT EPA REGION I POLICY AT OTHER SITES

The FS Appendix A (page A-2) references the Superfund Public Health Manual in noting that "site remedies should reduce ambient chemical concentrations to levels associated with a total carcinogenic risk range of 10^{-4} to 10^{-7}, where possible (EPA, 1986)." Selection of the target risk level is to be based on site-specific considerations. The approach followed by the EPA at the Old Springfield site in adopting a 10^{-7} target risk level for all media and exposure scenarios is not consistent with either site-specific characteristics that mitigate public health risk or recent precedents within EPA Region I.

Site-specific factors that mitigate risks include the following:

- There is no current risk through use of bedrock ground water in the site vicinity.
- Springfield has enacted Ordinance No. 88-2 to preclude development of any contaminated bedrock ground water in the future as a potable supply.
- The EPA has classified the aquifer as Class IIB (FS, page 2-4) (potential future use [no current use] as a potable supply), in accordance with the EPA Ground Water Protection Strategy.
- There are no bedrock ground water wells located between the former landfill and the Black River, and the potential for future development of this area is severely constrained by topography.
- A municipal water supply is readily available as an alternative to use of bedrock ground water.
- Permanent relocation of mobile home park residents is a component of the preferred alternative.

Recent EPA Region I RODs involving similar hazardous substance concentrations and geologic environments are summarized as follows:

- **Auburn Road Site**, Londonderry, New Hampshire
  Final ROD Date: September 17, 1986

  Contaminants of concern at this former municipal landfill include VOCs, semi-volatile organics, and inorganics. Contamination in on-site bedrock wells immediately across Auburn Road from currently used domestic bedrock wells evidenced total VOCs at 3,400 micrograms per liter (ug/l). The current risk through ingestion of bedrock ground water in the domestic wells was found to be acceptable at a 10^{-6} level. Maximum total VOC levels in ground water on site were reported to be in excess of 300,000 ug/l. In selecting remedial action at this site, the EPA considered provision of an alternative water supply adequate to protect residents along Auburn Road from potential future risk through ingestion of water from the wells.

- **Baird & McGuire Site**, Holbrook, Massachusetts
  Final ROD Date: September 30, 1986

  Residual VOC and PAH concentrations at this former chemical mixing and batching facility were defined to achieve a carcinogenic risk level of 10^{-6}.

- **Cannons Engineering Corporation**, Bridgewater, Massachusetts
  Final ROD Date: March 31, 1988

  Target cleanup levels established for VOCs and PCBs in soils were based on a residual risk level of 10^{-6}. The EPA considered the low probability of residential development and the availability of a municipal water supply as significant factors in deciding upon acceptable residual risks and in defining the preferred alternative. Natural renovation of the aquifer was considered appropriate in the absence of a current risk to ground water users.

- **Keefe Environmental Services Waste Site**, Epping, New Hampshire
  Final ROD Date: March 21, 1988

  Ground water target cleanup goals at this site were defined to achieve a target risk level of 10^{-5} (ROD, page 55).

Based on site characteristics and recent precedents within EPA Region I, a target risk level of 10^{-6} provides ample protection of public health and is consistent with recent EPA policy.

COMMENT NO. 2: THE REMEDIAL INVESTIGATION DOES NOT SUPPORT THE NEED FOR THE CAPPING OF THE LANDFILLED WASTES TO PROTECT AGAINST FUTURE INGESTION OF BEDROCK GROUND WATER TO THE EAST OF THE FORMER LANDFILL

BACKGROUND

The preferred remedial alternative publicly announced by the EPA calls for placement of a multi-layer, low-permeability cap over approximately eight acres of the Old Springfield site. The proposed cap area corresponds to locations associated with past landfilling activities on the eastern side of the site (i.e., designated Waste Areas 2, 3, and 4 in RI Figure 3-4). The cap is based on an assumed need to minimize the infiltration of precipitation falling directly on the waste areas. According to the EPA, percolation of the water through the landfilled wastes leaches contaminants from the wastes and thereby contributes to shallow ground water contamination. By the EPA's model, the shallow ground water contamination will then infiltrate into bedrock and degrade the quality of the bedrock aquifer such that bedrock ground water would eventually assume the same levels of contaminants found in the shallow aquifer.

According to the EPA, persons who would use the bedrock aquifer in the future for domestic water supply would be subjected to an unacceptable health risk. The EPA estimates plausible maximum incremental lifetime cancer risk to be 2×10^{-2} for ingestion of ground water from wells drilled into the bedrock aquifer to the east of the landfill in the future (FS, page 1-37). The potential future ingestion of bedrock ground water east of the landfill is identified as the most significant exposure pathway requiring remedial action (FS, page 1-37).

The EPA then used the same models employed in estimating risk to back-calculate acceptable contaminant levels in soils, assuming reduction of risk via use of bedrock ground water to the 10^{-7} criterion. This evaluation procedure led to the following conclusion by the EPA (FS, page 3-52):

> The target cleanup levels specified in Table 3-10 [3-18?] [relative to protection of persons ingesting bedrock ground water east of the landfill in the future] are relatively low. Considering these low target cleanup levels, it is apparent that any location where a contaminant of concern was detected [i.e., in soil], as indicated in the supplemental RI, should be remediated to reduce the future risk due to ground water ingestion to an acceptable level. (Emphasis and parenthetical notes added.)

The models and assumptions used by the EPA in this evaluation do not accurately represent site conditions. Accordingly, the postulated risk is overstated, and the resulting need to address all detectable contamination in soils via capping is not justified. Selection of more accurate input data for modeling and establishment of a more appropriate target risk level at 10^{-6} would lead to the conclusion that capping of the eight-acre former landfill is not needed to protect future bedrock ground water users.

BASIS FOR COMMENT

Specific concerns regarding EPA's modeling of ground water contamination and attendant risk to future ground water users east of the landfill are as follows:

1. The leach model used to derive contaminant concentrations in shallow ground water overestimates contaminant levels by using input data that are not representative of site conditions.
2. The infiltration model (i.e., migration of infiltrating surface water to the bedrock aquifer) overestimates potential infiltration by using unrepresentative data for flow from the springs and seeps along the eastern outslopes of the plateau, by ignoring the fact that infiltration through the site area may contribute a much smaller volume of water to bedrock flow than infiltration through the uplands to the south, and by ignoring the potential for upward hydraulic gradients from the bedrock into the till that would reduce or preclude flow to the bedrock aquifer in the vicinity of the former landfill.
3. Contaminant concentrations assumed in bedrock ground water ignore the important physicochemical processes of dilution and chemical attenuation.

These factors are discussed in the following paragraphs.

Leach Model

The EPA employed a standard equilibrium partitioning model (leach model) to estimate concentrations of contaminants of concern in shallow ground water in the immediate vicinity of the waste deposits. The model was also used in reverse to derive target cleanup levels in soil (waste) that will result in acceptable levels of contaminants in the bedrock ground water.

The leach model is sensitive to the fraction of organic carbon (foc) in the medium leached; organic carbon acts to retard leaching by adsorbing organic contaminants and making them unavailable to the leachate. The EPA modeling used an foc of 0.0023 percent to represent the solids being leached (FS Appendix A, page A-22). This value was taken from the geometric mean of five soil (i.e., non-waste) samples analyzed in the RI (FS

Appendix A, page A-22). The locations of these five soil samples were not identified in the RI and specific foc results were not reported apart from the geometric mean value. The EPA indicated during discussions on August 9, 1988, that one sample was of a "sediment" and two were from the glacial till materials. There is no indication that these samples are representative of the MSW/soil matrix from which the hazardous substances are leached.

MSW figures prominently in the list of wastes encountered in the waste areas at the site (RI Table 3-4), and MSW would be expected to contain much higher levels of organic carbon than that used by EPA in the leach model. DeMarco, et al. (1969), indicate that MSW may contain 15 to 30 percent carbon, much of which would be in the organic form. Tchobanoglous, et al. (1977), indicate that many MSW components contain 25 to 80 percent organic carbon.

The foc determined from analysis of soil samples is not representative of the actual foc of the MSW/soil matrix in the waste disposal areas. The EPA recognizes this in its discussion of risk due to inhalation of landfill gas (FS Appendix A, page A-11):

> "The relatively low fraction of organic carbon in the soil at the Old Springfield site (2.3×10^{-5} g/g), therefore results in high estimates of equilibrium vapor density. If additional organic matter is present in the form of paper and other municipal waste disposed with the chemical wastes, then the actual vapor density may be lower."

The incorrect application of this foc value results in the overestimation of ground water contamination and the development of unrealistically low soil cleanup criteria. The fact that actual maximum shallow ground water concentrations of the contaminants of concern are generally an order of magnitude lower than those derived from the leach model further demonstrates that the leach model does not accurately represent site conditions (EA Tables 3-4 and 3-5; RI Table 4-10).

Remcor analyzed the effect of using the more representative (albeit conservative) foc value of five percent. It was noted that the EPA's analysis of organic leaching from wastes at the Keefe Environmental Services site used an assumed foc value of five percent as representative of "glacial till" without the presence of MSW (which would increase the foc value). Using the conservative average foc of five percent for the MSW and soil from which contaminants could leach, calculated risks associated with contaminants of concern are significantly reduced by factors ranging from 6.9 for methylene chloride (the most mobile contaminant of concern) to 2,200 for bis(2-ethylhexyl)phthalate, PCBs, and PAHS (the least mobile) (Table 1). These corrections suggest that further evaluation of the leach model by the EPA is warranted prior to accepting the soil cleanup levels reported in the FS. Additional corrections to EPA's assumptions in modeling potential contaminant transport to the bedrock aquifer are discussed in the following sections. In aggregate, these corrections have a significant effect on soil cleanup levels and must be considered.

Infiltration Model

In the EPA analysis, contaminants are transmitted to the bedrock aquifer through infiltration of contaminated shallow ground water. The bedrock aquifer is of importance because future domestic wells east of the landfill, if any, would extract their supply from this zone, rather than from the till ("[g]round water above the bedrock in the glacial till is not typically used as a water source" [FS, page 1-39]). The impact of the former landfill on water quality in the bedrock aquifer is a function of the degree to which water infiltrating through the wastes contributes to the flow in bedrock in this area (i.e., the eastern portion of the bedrock aquifer flowing toward the Black River).

The EPA apparently attempted to analyze the contribution of infiltration through the wastes to bedrock flow through water balance calculations which incorporated the Hydrologic Evaluation of Landfill Performance (HELP) model. The EPA water balance analyzed the 130-acre watershed contributing recharge to bedrock. Using the HELP model to predict infiltration through the deltaic sands to the water table, the EPA then subtracted the seep flow to arrive at the volume of infiltration that would pass through the till and into bedrock. On this basis, the EPA concluded the following (RI, page 108):

> "If 50% of the recharge exits the system at springs and seeps, then approximately 50% must discharge as subsurface flow to surface water discharge zones. Since the site is underlain by bedrock, this quantity is the amount that enters bedrock by downward flow."

The EPA assumed that recharge to the shallow aquifer occurs predominantly via surface water infiltration to the uppermost deltaic sands. Much of this recharge exits the ground water system as seepage along the outslopes of the plateau at the site, and the remainder migrates vertically downward into bedrock. The EPA used the HELP model in an attempt to develop the water balance relating precipitation, infiltration, outslope seepage, and recharge to bedrock at the site. This water balance is presented in RI Tables 4-7 and 4-8.

The EPA made a number of assumptions in its water balance calculations that resulted in an overstatement of the amount of infiltration reaching bedrock. Furthermore, although the EPA recognizes that "in the immediate vicinity of the site where waste deposits are located, the volume [of infiltrating water] flowing downward to bedrock is much less" (RI, page 108), the contribution of such infiltration to bedrock ground water flow was never quantified. Had the EPA performed more representative water balance calculations, it would have determined that only a very small amount of the precipitation falling on the former landfill actually percolates through the till and reaches the bedrock.

Moreover, the results of the water balance were never used in evaluating the impact of the former landfill on bedrock water quality. Rather, EPA assumed that, under a "steady-state model," the concentrations of contaminants in the bedrock aquifer would eventually be the same as those found in the shallow aquifer (FS Appendix A, page A-21). This assumption is erroneous.

The EPA water balance analysis contains two basic flaws:

- The analysis ignored the presence of the approximately 60 feet of low-permeability till that overlies bedrock at the site

- An inappropriate value for discharge from the eastern springs and seeps was assumed.

The till layer that underlies the deltaic sands at the site is on the order of 60 feet thick and exhibits an average permeability of 1×10^{-5} centimeter per second (cm/sec) (RI Table 4-4). This till layer, which was ignored in the EPA modeling, represents a significant barrier to infiltration to the bedrock aquifer.

Rigorous analysis of infiltrating flows (and contaminant transport) requires sophisticated computer modeling, but the relative rates of infiltration per unit area can be approximated by comparing the permeabilities of the layers through which infiltration occurs. The vertical permeability of "loamy fine sand" that was used in EPA's HELP model to represent all materials overlying bedrock within the plateau and outslopes is 3×10^{-3} cm/sec (standard default value from the HELP model). The permeability of the till that actually overlies bedrock at the site is 1×10^{-5} cm/sec. Had the EPA considered the effect of the till, the calculated infiltration rate on a unit area basis would have been reduced by a factor of 300 ($3 \times 10^{-3}/1 \times 10^{-5}$).

The EPA modeled upland areas as a layer of "fine sandy loam" (HELP model default permeability of 1.9×10^{-3} cm/sec). This assumption for upland areas may be reasonable considering that till is absent over at least portions of the uplands, and bedrock is exposed in these uplands (Doll, 1970). Where present in the uplands, the till would be thinner; for example, at the well for the Bond residence along Will Dean Road south of the site (in the "uplands"), the total depth to competent rock (i.e., "ledge") was reported as 20 feet.

The permeability of the infiltration layer used in the EPA modeling for upland areas is 190 times the permeability of the till within the plateau $(1.9 \times 10^{-3}/1 \times 10^{-5})$. By comparing these relative permeabilities, the infiltration in upland areas on a unit area basis would then be 190 times that at the plateau and outslopes. Considering that approximately half of the 130-acre surface watershed (45 acres of uplands and 20 acres of plateau and outslopes) may contribute recharge to the bedrock on the eastern side of the former landfill, the total infiltration contributed by the plateau and outslope areas would be 0.23 percent ([20 acres/190 x 45 acres]) of that contributed by the uplands. Waste areas on the eastern side of the site total approximately 8 acres. The waste area would then be calculated to contribute 0.093 percent ([8 acres/20 acres] x 0.23 percent) of the total potential infiltration to bedrock on the eastern portion of the site (or total bedrock flow toward the Black River at this point).

Even adopting the very unrealistic position that no adjustment is to be made for the relative permeabilities of the upland and plateau areas, the infiltration through waste areas would be diluted by infiltration from the remainder of the watershed. By simply comparing areas contributing infiltration, the infiltration through the waste would contribute no more than 12 percent (8 acres/[45 acres + 20 acres]) of the total bedrock ground water flow toward the Black River. Consequently, the contribution of infiltration through the waste to bedrock ground water flow is much less than that predicted by the EPA.

Predicted contaminant contributions from infiltration through the waste would be significantly less than that calculated by relative flows (dilution) because of chemical attenuation (partitioning). As the water carrying contaminants migrates through the till, the contaminants would be adsorbed onto the till and would be retarded to varying degrees along the entire pathway through the till to the bedrock aquifer. The degree of such attenuation can be calculated for each contaminant of concern using basically the same chemical partitioning model used in the leaching analysis (FS Appendix A, page A-21). Table 2 presents retardation/attenuation factors for each of the contaminants of concern, reported as the velocity of water flow compared to the velocity of contaminant transport.

The dilution of the infiltration through waste by the total infiltration to the eastern portion of the bedrock aquifer (minimum factor of 8.1 [1/12 percent]) and attenuation (as measured by the retardation factors given in Table 2) can then be combined to illustrate a more realistic relationship between contaminant levels in the shallow and bedrock aquifers. For the contaminants of concern, these relationships (shallow concentration/bedrock concentration) are given in Table 3. As seen from these ratios, effectively none of the less mobile phthalates, PAHs, and PCBs would be expected in bedrock, and significant reductions in the concentrations of the more mobile VOCs would also be expected to occur. By reference to Table 3, for example, it is evident that the concentration of benzene in the bedrock ground water would be 0.3 percent (1/370) of that predicted by EPA's "steady-state" model.

The relatively small contribution of infiltration through the waste to bedrock flow negates the EPA's assumption that a "steady-state" condition would be achieved and that the concentrations of contaminants of concern in the bedrock aquifer to the east of the former landfill would, under "steady-state" conditions, equal those in the shallow ground water. In fact, the concentrations in the bedrock aquifer would be reduced by at least the factors given in Tables 1 and 3. The EPA's ground water flow and contaminant transport analyses leading to the calculated risk for bedrock ground water must be re-evaluated. Correction of errors and omissions in these analyses and use of a more-appropriate target risk level to derive soil cleanup levels for contaminants of concern would lead to the conclusion that capping of the eight-acre landfill area is not needed.

In the water balance, the quantity of infiltration to bedrock is the remainder after subtracting runoff, evapotranspiration, and seep flow from total rainfall. Septic tank flows from mobile home residents are also added to potential infiltration. The EPA water balance calculation analysis assumed that seepage flow from the eastern seeps was 8.5 gallons per minute (gpm) (RI Table 4-8). This flow corresponds to the minimum observed in the six seep discharge measurements taken at the site from September 1987 through April 1988 (RI Table 4-6). Using a minimum value is inappropriate; the HELP model is based on annual average conditions (i.e., precipitation, runoff, evapotranspiration), not minimum values. The EPA recognizes this fact at the western seeps where the "arithmetic mean of west slope discharge" was used (RI Table 4-8); the EPA also states that "it is recognized that this [8.5 gpm] is likely to be a low estimate" (RI, page 107). In fact, the minimum discharge from the eastern seeps is so low that it is not representative and results in an errant calculation of recharge to bedrock (by subtraction). Table 4 presents a statistical evaluation of the actual seep flow measurement data presented in the RI. Actual site data show that, with 95 percent confidence, the true average flows of the eastern and western seeps are at least 24.0 and 31.5 gpm, respectively.

As noted in Table 4, the arithmetic mean eastern slope seep discharge is 71.7 gpm. Using this value, the water balance calculation would indicate that there would be no infiltration to bedrock and, in fact, there would be a water deficit. This deficit suggests that the flow of the seeps cannot be accounted for simply by rainwater infiltration and septic flow and that another source of water must be present. This other source could be the bedrock aquifer that discharges water upward. The possibility of such upward flow is supported by the fact that certain monitoring wells screened in bedrock (i.e., Wells MW-6 and MW-20/20D) show a higher potentiometric head than is present in the overlying till. Remcor recognizes that site data are inconclusive relative to the extent to which the bedrock discharges upward.

The EPA contractor notes in its August 2, 1988 cover letter transmitting Appendix A to the FS Report that "since no contaminants have been detected in bedrock wells along the (Black) river, a steady-state transport model was developed and used to estimate the maximum bedrock concentrations along the river." The RI data do not support the assumption that steady-state conditions will be achieved in "several years" (FS Appendix A, page A-21).

The easternmost portion of Waste Area 3 has been in existence for over 40 years, and lies within 400 feet of bedrock Monitoring Wells 20 and 20D. Remcor's analysis of RI data indicates a flow velocity in bedrock on the order of 80 to 140 feet per year (ft/yr) (Table.5). If the EPA's steady-state model was correct, Wells 20 and 20D would have been contaminated for more than 20 years. Yet, the actual site data given in the RI demonstrate that these wells evidence no contamination (RI Table 4-10).

The alternative interpretation, as discussed previously, is that contaminant loading to bedrock from the site is such that no detectable contamination will occur in bedrock wells along the Black River. The EPA's disregard for environmental fate processes (e.g., dilution, dispersion, adsorption) has overstated the exposure point concentrations in bedrock ground water.

SUMMARY

The EPA's postulated risk for ingestion of bedrock ground water is the driving force in its establishment of the limits of analytical detection for contaminants of concern as target soil cleanup levels. These cleanup levels led to the proposed capping of the eight-acre former landfill in the eastern portion of the site. This exposure scenario also drives cap design to the extent that a low-permeability cap material is considered necessary to reduce infiltration. The RI data do not support the need for capping the former landfill to protect future potential users of bedrock ground water east of the former landfill:

- The equilibrium partitioning of contaminants from waste materials to ground water overestimates contaminant levels by the factors given in Table 1 due to an inappropriately low foc value employed in the EPA leach model
- Water balance calculations overestimate the recharge to bedrock from vertical infiltration
- Consideration of dilution and attenuation results in significantly lower predictions of contaminant concentrations in bedrock (Table 3)

- Site data indicate that vertical upward gradients may exist (Monitoring Wells 6, 20, and 20D) in the bedrock underlying till in the eastern portion of the site, but RI data are not adequate to quantify the extent of such upward movement
- There are no data showing bedrock contamination on the eastern portion of the site after wastes have been in place for over 40 years.

EPA's conclusion that bedrock ground water will evidence contamination similar to that found in the shallow aquifer under impending "steady-state" conditions is erroneous. A more plausible explanation is that, due to dilution and chemical attenuation, bedrock ground water will never evidence detectable levels of contamination, and the "steady-state model" is wrong.

COMMENT NO. 3: THE REMEDIAL INVESTIGATION DOES NOT SUPPORT THE NEED FOR CAPPING OF LANDFILLED WASTES TO PROTECT AGAINST OFF-SITE EXPOSURE VIA INHALATION OF CHEMICALS IN LANDFILL GAS

BACKGROUND

According to the EPA, risks associated with inhalation of landfill gases represent the second driving force for installation of the low-permeability synthetic membrane cap (and accompanying gas venting system). Again, however, the EPA model of gas emissions from the landfilled wastes is erroneous. In addition, the inaccuracy of the emissions model is then compounded by unrealistic assumptions relative to soil VOC levels, area of the emission source, frequency of exposure, and presence of organic carbon in landfilled soils retarding partitioning of VOCs into the air. EPA's postulated (although undocumented) current on-site risk will be curtailed with relocation of the residents of the mobile home park. The EPA also makes no distinction between residents living on the site and the nearest off-site residents along Will Dean Road, even though the off-site residents live at least 700 feet from the former landfill.

BASIS FOR COMMENT

The EPA model to determine potential risks associated with inhalation of landfill gases is flawed, leading to overestimation of such risks. The EA (Appendix C, Section C.4) and FS (Appendix A) do not provide all of the input data used by the EPA in its calculations of the rates at which potentially hazardous chemicals could escape from the landfilled waste in the landfill gas. In particular, EPA did not provide the data necessary to compute the flux rates of the contaminants of concern from the MSA/soil matrix. Accordingly, Remcor was not able to recreate the EPA calculations in examining the EPA analysis, but a simple mass-balance calculation was performed to evaluate the EPA model.

Remcor's mass balance calculation was based on the EPA "box model" described in the EA (Appendix C, page C-16). In the box model, gases are evolved from the landfilled wastes and are dispersed into an assumed volume of air (i.e., the "box"). The air moves through the box at a rate determined by the average wind speed. Using the airborne concentrations of contaminants developed in the EPA risk analysis (EA Table 4-4) and the flow through the box, the mass flow rates of contaminants dispersed in the air were calculated. The masses of contaminants dispersed in the air, and therefore leaving the site, were then compared to the masses of contaminants in the landfilled wastes that are the source of the airborne contamination.

Using the data presented in the EA and very conservative assumptions where the EA failed to provide needed data, Remcor has determined that the EPA model significantly overestimates the rates at which chemicals are emitted in landfill gas and, therefore, overstates the resulting airborne concentrations (see Attachment 1). As an example, Remcor's mass balance calculation for chloroform (a contaminant of concern that contributes significantly to EPA's postulated risk) showed that, at the evolution rates given in the EPA model, all of the chloroform in the landfilled waste (i.e., the source of the airborne concentrations) would be evolved in 5 hours and 6 minutes, and all of the contaminants contributing significantly to the postulated risk (i.e., benzene, chloroform, and trichloroethylene) would be depleted within three days (see page 6 of 6, Attachment 1). It is evident from these straightforward mass balance calculations alone that the EPA's risk evaluation, which is based on a 70-year duration of exposure to the airborne gases, is seriously flawed.

Errors in emission rates notwithstanding, the EA uses the maximum soil VOC levels as "representative of the entire site." Without defining the "entire site," an area of 12,040 square meters (m^2) is identified as the emission source (EA, page C-21). In reality, the EPA has identified an area of only about 1,700 m^2 associated with the higher VOC levels on site. The EA indicates that an area-wide emission source was used as a basis for risk because "the data ... are not sufficient to isolate hot spots of volatile contamination that would allow a more accurate determination of source areas." Yet, RI Figures 3-12 through 3-14 specifically define the VOC "hot spots."

With regard to exposure, the EA also unrealistically assumes continual exposure to ambient air at the site for a 70-year lifetime. Residents would have to remain outside from birth in the vicinity of the highest VOC levels found at the site to achieve such an exposure. In view of the permanent relocation of residents from the mobile home park and the institutional controls afforded by Springfield Ordinance No. 88-2 regarding future development, there appears to be insufficient basis for an exposure scenario that places the receptor on site continually for an entire lifetime.

Finally, the EA underestimates the probable organic carbon content of the soil and waste (see Comment No. 2). The use of an foc value that is unrepresentatively low overestimates the flux rate of VOCs from soil to air.

Even using EPA's erroneous assumptions and unrealistic exposure scenarios, the average case, upper bound excess lifetime cancer risk for inhalation of landfill gases is 9 x 10^{-5}, which is within the EPA's acceptable range (10^{-4} to 10^{-7}). EPA's theoretical "plausible" maximum case risk (5 x 10^{-3}), however, is not plausible. The plausible maximum risk calculations are driven by the occurrence of two contaminants, chloroform and benzene. The EA assumes that the maximum concentrations of chloroform (380 micrograms per kilogram [μg/kg]) and benzene (5,600 μg/kg) are prevalent over the "entire site." In reality, these levels were found only at SO-10 (chloroform) and 60-001 (benzene). Chloroform was detected in only four other surface soil samples (range: 4 to 95 μg/kg) and two subsurface soils (2 and 4 μg/kg). In addition, sampling of soils in the same vicinity as Sample SO-10 (Sample OSS-10) one year earlier (1985) did not show any detectable contaminants (RI Tables 3-5, 3-6, and 3-7). Benzene was detected in four other surface soil samples (range: 2 to 40 μg/kg) and one subsurface soil (1 μg/kg). Use of maximum levels are clearly not representative of site-wide contamination and are not appropriate for estimation of inhalation risk.

Attachment 1 demonstrates that the EPA emission model substantially overstates concentrations of chloroform and benzene in landfill gas and ambient air. The EA does not document a potential risk through inhalation of landfill gas sufficient to support any remedial action at this site.

COMMENT NO. 4: THE OUTSLOPES OF THE FORMER LANDFILL SHOULD NOT BE CAPPED

BACKGROUND

The preferred remedial action announced by the EPA anticipates capping a total of approximately eight acres, reflecting areas of landfilled waste disposal in the eastern portion of the site. This proposed cap area includes approximately two acres of steep outslopes along the eastern periphery of the waste disposal areas.

According to the FS, such capping has been proposed to protect the quality of the bedrock aquifer and its construction "should not prove to be difficult" (FS, page 7-23). In fact, the need for capping of the outslopes has not been established, and the feasibility evaluation of the capping has not addressed serious issues of short-term adverse impacts, constructibility, and cost.

BASIS FOR COMMENT

Need for Capping

As discussed in Comment No. 2, site data do not support the need for the capping proposed by the EPA at the Old Springfield site. This is particularly relevant to the steep outslope areas. The RI has developed no empirical data that indicate hazardous substances are present in the waste materials on the steep outslope areas. The steepness of the landfill outslopes promotes runoff of surface water, and infiltration on such slopes would emerge quickly at the nearby seeps.

The relative contribution of infiltration of surface water through the waste to total infiltration to bedrock (i.e., bedrock flow) was discussed in Comment No. 2. Using the permeability of "loamy fine sand" (1.9 x 10^{-3} cm/sec from HELP model) selected by the EPA to model infiltration to bedrock in the upland areas (RI Table 4-7) and the permeability of the till materials mantling bedrock in the vicinity of the former landfill (10^{-5} cm/sec), it was demonstrated that infiltration in the upland is 190 times that through the plateau and outslope areas, as defined by the EPA. On this basis, infiltration through the former landfill may be considered to contribute 0.093 percent of bedrock flow toward the Black River in this area. Similarly, the two acres of landfill outslopes would contribute only 0.024 percent ([2 acres/8 acres] x 0.093) of the total bedrock flow. Based simply on a ratio of areas, the defined cap areas on the outslopes, as noted in RI Figure 5-1 (2 acres), contribute only about three percent (2 acres/65 acres) of the total infiltration to the bedrock aquifer flowing toward the Black River in this area. In reality, the contribution would be much less because of the higher potential for runoff, and the tendency for infiltration to emerge quickly as seep flow.

Even if differential permeabilities are not considered, based on the data presented in the RI, capping of the outslope areas is not needed to mitigate contaminant migration in surface water runoff. The EPA concurs with this assessment, stating that surface water runoff is not considered to be a significant contaminant transport mechanism on the outslope areas (RI, page 157).

Cap Constructibility and Construction Risk

The desirability and cost-effectiveness of capping the slopes is questionable given the problems of constructibility, risk associated with construction, and the minimal benefit attributable to reduction in recharge to the bedrock aquifer.

Conventional capping techniques are well suited for areas of mild or gentle slopes, but are generally very difficult to apply to steeply sloping areas. In the FS (page 5-12), the EPA has partially recognized this condition and has stated that areas to be capped must first be regraded to three horizontal to one vertical (3:1) slopes. This slope modification would, according to the FS (page 7-19), involve the excavation and relocation of approximately 19,000 yd^3 of wastes at the site.

The stability of the cap on the slopes is imparted by friction, in the form of a resistance to sliding, between the layers of the various cap materials and the internal friction of the soil materials used. The "friction angle" is used in geotechnical analysis to quantify the resistance to sliding. In the EPA design (FS Figure 4-1), the critical surface (i.e., least friction) is that between the flexible membrane liner and the overlying drainage blanket of sand and drainage net. Martin, et al. (1985), report that the friction angle between a high-density polyethylene (HDPE) membrane, like that specified in the EPA design (FS Section 4.4.2, page 4-15), and sand materials ranges from 17 to 18 degrees. At a 3:1 slope (18.4 degrees), the factor of safety against sliding at the critical surface is less than 1.0, and failure is predicted. Therefore, to provide the appropriate factor of safety against sliding, the overall grade of the outslopes would have to be reduced to approximately 4:1. Achieving such grades would require excavation and relocation of about 47,000 yd^3 of the waste, as opposed to approximately 19,000 yd^3 estimated by the EPA to achieve an overall grade of 3:1. The impacts associated with waste handling, as well as the costs of such movement would be correspondingly amplified.

The heterogeneous nature of the MSW within these outslopes also would present significant difficulties in handling of materials and compacting the graded slopes to receive the cap. The possibility of encountering hospital waste materials likewise cannot be discounted. Excavation and capping of the outslope areas would also require clearing any existing vegetation seriously affecting the current aesthetics of the outslopes.

In addition, the existing outslope areas at the Old Springfield site are prone to instability problems manifested as landslides. The outslopes are presently at or near the angle of repose of the materials, the MSW having been dumped into place in the existing ravines. In fact, the FS discusses recent landslide activity on both eastern and western outslopes on page 1-14. Disturbance of the outslopes would be likely to exacerbate this unstable condition.

Given the instability of the outslopes and the other risks of construction, the difficulties and costs associated with construction and the minimal benefits associated with capping of the outslopes, these areas should not be capped.

COMMENT NO. 5: THE POTENTIAL RISK ASSOCIATED WITH CONTACT WITH CONTAMINATED SURFACE SOILS SUGGESTS COVERING AND FENCING APPROXIMATELY 1.5 ACRES OF THE FORMER LANDFILL TO ADDRESS A TARGET RISK LEVEL OF 10^{-6}

BACKGROUND

Contact with contaminated surface soils has been estimated by the EPA to present a current risk to residents living on the site. The on-site exposure period for children is assumed by the EPA to be 5 years, while that for adults is assumed to be 52 years.

Relocation of the mobile home park residents and control of future site access will mitigate on-site risk. Under the assumption that site security may not be fully maintained, it is prudent to cover the source areas and to provide security fencing specific to these areas. Remcor considers the plausible maximum case, current on-site use to be an adequately conservative basis to define the areas to be covered and fenced at a target risk level of 10^{-6}, as presented in FS Table 3-1.

BASIS FOR COMMENT

Because permanent relocation of the mobile home park residents is a component of the preferred alternative, current risk will be mitigated. The plausible maximum exposure point calculation for current on-site contact with soils by children assumes an "average exposure period between ages 6 and 11" and children playing on the site four days per week, six months out of the year (EA, page C-2). Given the relocation of current residents and the presence of institutional controls to control future development, this represents a very conservative future exposure scenario. PAH and PCB concentrations drive the risk. Therefore, covering and fencing an area of 1.5 acres, encompassing Borings OSS-3, SO-04, 46, 60, 71, 77, 83, 88, MW-21, and OSS-6 will protect against the plausible maximum risk of 10^{-6}. The target soil cleanup levels derived to protect against dermal contact with soils at a target risk level of 10^{-6} are reported in Table 3-1 of the FS.

COMMENT NO. 6: SELECTION OF CAP CONFIGURATION SHOULD BE MADE ON THE BASIS OF STUDIES PERFORMED DURING REMEDIAL DESIGN

BACKGROUND

The preferred alternative publicly announced by the EPA includes a very specific design for capping at the site. A single-layer soil cap is eliminated from consideration because of anticipated problems with cracking (FS, page 4-14 and Exhibit 2, EPA Proposed Cleanup Plan) in favor of a multi-layer cap relying on a single 40-mil flexible membrane to provide an additional hydraulic barrier. Differential settlement is ongoing within the MSW landfill as the wastes degrade. A flexible membrane liner may not possess adequate tensile strength and elasticity to withstand such subsidence over the life of the cap. Moreover, the cap design identified in the preferred alternative was taken from the EPA guidance documents for the design of new hazardous waste landfills. The conditions at the Old Springfield site (e.g., manner of waste placement, compaction, and cover; site preparation prior to waste placement; current stability of the landfill surface) are quite different than those for a new hazardous waste landfill. The EPA's specification of this design may be inappropriate to address site conditions. If a low-permeability cap configuration is required at this site, the cap design should not be defined in the ROD. Rather, cap design should be specified only after remedial design studies have been completed.

BASIS FOR COMMENT

If a low-permeability cap design is deemed necessary for this site, it is inappropriate to specify a particular cap design in the ROD if such specification eliminates the possibility to develop an equivalent cap configuration during remedial design. The pertinent Resource Conservation and Recovery Act (RCRA) performance standards that provide guidance in design of the cap for this site are those established at 40 Code of Federal Regulations (CFR) 264.310 for landfills. Such standards specify the following [40 CFR 264.310(a)]:

(a) At final closure of the landfill or upon closure of any cell, the owner or operator must cover the landfill or cell with a final cover designed and constructed to:

  (1) Provide long-term minimization of migration of liquids through the closed landfill;

  (2) Function with minimum maintenance;

  (3) Promote drainage and minimize erosion or abrasion of the cover;

  (4) Accommodate settling and subsidence so that the cover's integrity is maintained; and

  (5) Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

As a former MSW landfill, the Old Springfield site is susceptible to settlement as the MSW materials degrade. The EPA recognizes that waste degradation is continuing as evidenced by its incorporation of methane gas collection and venting system in the preferred alternative. In addition, residents have reported evidence of ongoing settlement within the landfill.

Surface settlement is a particular concern in cap design in that such settlement can lead to the mechanical failure of the cap system. Mechanical failure leads, in turn, to failure of the hydraulic barriers to infiltration. The EPA technical handbook for cap design at uncontrolled hazardous waste sites (McAneny, 1985) states the following:

> "A thick barrier of compacted soil, while not completely impervious, will be much more inherently durable and resistant to mechanical failure than a barrier consisting of a single thin membrane or member."

The cap design to be employed at the Old Springfield site, if any, will have to consider the potential for differential settlement within the MSW. A soil cap may prove more reliable than a flexible membrane. Such an evaluation should be performed in the remedial design phase.

COMMENT NO. 7: THE DATA DEVELOPED IN THE REMEDIAL INVESTIGATION DO NOT SUPPORT THE NEED FOR EXCAVATION OF AREAS BEYOND THE LIMITS OF THE FORMER LANDFILL AND CONSOLIDATION OF THESE MATERIALS UNDER THE PROPOSED CAP

BACKGROUND

The draft final FS Report anticipates the need to excavate approximately 6,000 yd^3 of "waste" from Waste Area 1 and a second area in the northwestern portion of the site (Boring OSS-2) on the basis of the leaching to ground water scenario (FS Figure 3-5). Based on the reasons set forth in Comment No. 2 (e.g., erroneous foc value and water balance calculations), EPA's data do not show unacceptable risks in these areas resulting from ingestion of bedrock ground water. Risks due to inhalation of chemicals in landfill gas (most notably chloroform) have been grossly overstated in EPA's emission model, as discussed in Comment No. 3.

BASIS FOR COMMENT

As discussed in Comment No. 2 concerning the waste areas on the eastern side of the site, current site data do not support the need for remedial action (source control) to address the satellite areas to protect bedrock ground water. The low levels of PCBs and PAHs found at Boring OSS-2 (RI Tables 3-5, 3-6, and 3-7) certainly will not migrate to and degrade bedrock ground water quality (see Tables 1 and 2). The 380 µg/kg of chloroform found in Surface Soil Sample SO-10 in Waste Area 1 (RI Table 3-5) is also of questionable reliability in that previous sampling in this area (Sample OSS-10) revealed no detectable contamination.

In addition, air emissions from Waste Area 1 were determined by the EPA to pose an unacceptable on-site risk based on an inappropriately low foc value for waste materials and the assumption that persons remain on site for 70 years. Current site residents will be permanently relocated as part of the preferred alternative. As discussed in Comment No. 3, EPA's emission model grossly overestimates airborne concentrations. The calculations are appended to this comment letter (Attachment 1) to demonstrate that the EPA emission model significantly overstates air concentrations of contaminants. There is no basis for excavation and relocation of "wastes" from Waste Area 1 or the vicinity of Boring OSS-2 to protect against an unacceptable inhalation risk.

The risk of contacting contaminated surface soils, based on a target risk level of 10^{-6}, suggests remedial action may be appropriate only at the northwestern area in the vicinity of Boring OSS-2. This risk is driven by the presence of three PAHs, each at the limit of analytical detection (330 ug/kg) (RI Table 3-5). The finding of these contaminants in a single sample at the limit of analytical detection is insufficient basis for remedial action.

Therefore, the only action that may be warranted for the two outlying areas identified by the EPA is covering and fencing of the area immediately surrounding Boring OSS-2. There is clearly no basis in risk for excavation of these areas.

COMMENT NO. 8: THE DESIGN OF THE LEACHATE COLLECTION SYSTEM ON THE EASTERN SIDE OF THE SITE SHOULD BE MODIFIED TO ADDRESS COLLECTION OF THOSE SEEPS EVIDENCING CONTAMINATION, AND THE INSTABILITY OF THE EASTERN OUTSLOPES SHOULD BE CONSIDERED IN LOCATING THE COLLECTION SYSTEM

BACKGROUND

The preferred alternative incorporates installation of a continuous, 2,600-foot leachate collection trench at the approximate outcrop of springs and seeps along the eastern outslopes of the plateau. The collected leachate would then be conveyed to a central treatment unit located on the plateau. The trench is shown in cross section in FS Figure 5-11. The constructibility of this trench is severely limited by topography. In addition, documented slope instability on these steep outslopes (FS, page 1-14) would constitute an ongoing threat to the integrity of the collection system. There is currently no justification on the basis of risk or evidence of contamination to collect all eastern springs and seeps.

An alternative design for the eastern leachate collection system should be considered to alleviate potential problems associated with slope stability and difficulties in construction and maintenance of the system resulting from placement of the collection trench on the outslope. In addition, only those seeps evidencing contamination should be collected at this time. Periodic monitoring of the remaining springs and seeps will provide an indication of the need for collection of additional seeps in the future. Accordingly, the ROD should specify the seeps to be collected but provide the necessary flexibility for design of the collection system during the remedial design phase of the project.

BASIS FOR COMMENT

To be constructed to drain properly to a single catchment at the northern extremity of the collection trench, as shown in FS Figure 5-14, the trench would have to follow the topography along the eastern outslopes of the plateau. The extremely steep outslopes in the areas of Seeps LSE-1, LSE-2, and LSE-3, and the ongoing degradation of the MSW and the inherent instability of the outslopes of the landfill in these areas (FS, page 1-14) would present severe problems for construction and maintenance of the system. Clearing and grubbing of established vegetation on these outslopes, necessary for installation of the interceptor, would further exacerbate problems associated with stability of the slopes and would blight the landscape in this area.

An alternative that would be more readily constructed and maintained would include installation of a continuous main collector on a bench at the base of the outslope, with laterals ascending perpendicular to the grade to specific seeps to be collected. The seepage could be drawn to a common point via a french drain at the outcrop of the seep and conveyed into the lateral downdrain. The french drains would be located at the preferential outcrop of the seep (in most cases the intersection of the downslope toe of fill material and a former ravine on the outslope), and would, therefore, collect all seepage at that point. The french drains and lateral downdrains would also permit collection and conveyance of the leachate with minimal potential for emission of VOCs.

The continuous collection system is favored in the preferred alternative over the alternative of collecting only the previously identified contaminated seeps (i.e., LSE-2, LSE-3, and LSE-4) (Alternative MM-2, FS, page 5-28). There is no current basis for collection of all seeps along the eastern outslopes. A more prudent use of resources would be collection of only those seeps evidencing contamination, with periodic monitoring of the seeps to determine whether the pattern of contamination changes during seep collection. Any additional contaminated seeps could then be collected at that time.

Locating the main collection piping on the existing bench and collecting only those seeps identified as being contaminated would also result in a much smaller area of disturbance of established vegetation along the eastern outslopes of the plateau.

COMMENT NO. 9: PLACEMENT OF INTERCEPTOR WELLS ALONG WILL DEAN ROAD INTO THE SAND AND GRAVEL WATER-BEARING ZONE SHOULD BE REEVALUATED

BACKGROUND

The preferred alternative anticipates installation of ground water interceptor wells along Will Dean Road into the sand and gravel water-bearing zone overlying bedrock in this area. EPA concludes that this zone represents a preferential pathway for migration of contaminants from the former landfill to western leachate seeps to the northwest. Additional data are required relative to this water-bearing zone prior to dewatering the zone by interceptor wells.

BASIS FOR COMMENT

Based on the supplemental RI studies in April 1988, EPA identified a sand and gravel zone underlying the glacial till and directly overlying bedrock in the western portion of the plateau. EPA concludes that this zone represents a drain for the till and bedrock because the hydraulic conductivity of this zone is approximately two orders of magnitude greater than that of either till or bedrock (RI, page 94). Analytical results from the sampling of Monitoring Well 29D, screened in the sand and gravel zone, evidence contamination by VOCs (RI Table 4-12). The preferred alternative anticipates installation of interceptor wells into the sand and gravel zone for extraction of contaminated ground water.

The recent identification of this zone, the lack of definition of its boundaries and overall role in site hydrogeology, and the lack of an understanding of the effects of dewatering this zone on the hydrogeologic regime and on domestic wells in the site vicinity argue for further definition prior to initiation of ground water interception and treatment.

COMMENT NO. 10: LEACHATE (AND EXTRACTED GROUND WATER) FROM THE SITE SHOULD BE PRETREATED AND DISCHARGED TO THE SPRINGFIELD PUBLICLY OWNED TREATMENT WORKS, RATHER THAN DISCHARGED DIRECTLY TO A SURFACE DRAINAGE FOLLOWING ON-SITE TREATMENT

BACKGROUND

The EPA rejects discharge of leachate and ground water from the site to the local POTW because of "failure to receive approval to discharge from the POTW operator, and uncertainty as to treatment capabilities of POTW" (FS Table 4-3, page 4-37). However, it appears that all parties agree that treatment of any collected seeps and ground water at the POTW is preferable to EPA's proposal for on-site treatment and discharge directly to a surface drainage. Although all of the issues pertaining to treatment at the POTW have not been finally resolved, these details should be addressed through design studies during implementation of the ROD.

BASIS FOR COMMENT

Discharge of pretreated effluent from the site directly to surface waters, as proposed by EPA in the preferred alternative may entail the need for more extensive on-site treatment capacity and redundancy to avoid uncontrolled releases of untreated leachate or extracted ground water from the site. In addition, EPA's proposal does not fully consider aesthetic concerns raised by the local residents. It may be possible to locate the treatment plant adjacent to the POTW. The ROD should be flexible enough to allow this result and need only specify the level of treatment required, either on site or at the POTW.

COMMENT NO. 11: THE SLURRY WALL PROPOSED BY EPA AS AN OPTION WITHIN THE PREFERRED ALTERNATIVE WOULD HAVE LIMITED EFFECTIVENESS

BACKGROUND

The FS development of Alternative SC-2 (FS Section 5.2.2) incorporates an optional slurry wall enclosing the approximate eight-acre cap on the north, west, and south, and open to the east along the landfill outslopes. The wall would be three feet in width and constructed of a soil/bentonite slurry to a depth of approximately 50 feet. At this depth, the wall would be keyed into the low-permeability till. The stated objective of the wall is to complement the cap in restricting lateral flow of ground water from upgradient areas through the wastes (FS, page 5-12). The proposed slurry wall is shown in plan in FS Figure 5-2.

BASIS FOR COMMENT

The slurry wall considered by the EPA would have limited success in reducing lateral migration of ground water through the till and into the waste materials along the outslope. Based on EPA's conceptual model of ground water flow shown in RI Figure 4-9 (page 96), the sand and gravel water-bearing zone acts a drain to encourage lateral ground water movement to the west, rather than toward the former landfill. The slurry wall in its present location (FS Figure 5-2) would counteract the effects of the sand and gravel zone. If the sand and gravel zone behaves as EPA contends, then the slurry wall would not be required to divert lateral ground water movement around the wastes.

Other concerns relative to the construction and design of a slurry wall include the impact that such a wall may have on altering the hydrogeologic regime in the local area. For example, the eastern outslopes of the plateau are characterized by instability. The potential effects on the stability of the outslopes of diverting ground water flow around the former landfill and discharging it in a concentrated manner along the outslopes at the terminus of the wall must be considered in evaluating the advisability of altering site hydrogeology with a slurry wall.

CLOSING

Again, we appreciate the opportunity to provide these technical comments on the draft final project documents and the preferred alternative. We trust that you will find them of value in proceeding with remedy selection. In addition, you will note that we have included resumes of principal contributors to this comment letter in Attachment 2 for your reference.

Very truly yours,

John A. George

John A. George
Project Manager

Leo M. Brausch
Vice President

JAG:LMB:rmv
Attachments

cc: Mr. David Webster, EPA Region 1
Mr. William Walsh-Rogalski, EPA Region 1

TABLES

TABLE 1

CORRECTION FACTORS FOR LEACHED MEDIUM CARBON CONTENT

CONTAMINANT OF CONCERN(1)	ORGANIC CARBON PARTITION COEFFICIENT(2)	CORRECTION FACTOR(3)
Benzene	65	44
Chloroform	44	30
Methylene chloride	8.8	6.9
Tetrachloroethylene	364	220
Trichloroethylene	126	83
Bis(2-ethylhexyl)phthalate	2.0×10^9	2,200
PCBs(4)	1.1×10^6	2,200
PAHs(5)	5.5×10^6	2,200

(1) Contaminant of concern are those identified in FS Table 3-18 as significant for the ground water ingestion risk scenario.

(2) The organic carbon partition coefficient is an intrinsic chemical property reflecting the tendency of the chemical to adsorb to organic carbon in solids and not leach. Values were taken from Mabey, et al (1982).

(3) Calculated using formula A-10 given in FS Appendix A, page A-21. All EPA input data were used except foc = 5 percent.

(4) All PCBs. Organic carbon partition coefficient is for Aroclor 1254.

(5) All carcinogenic PAHs. Organic carbon partition coefficient is for benzo-(a)-pyrene.

TABLE 2

RETARDATION FACTORS FOR ATTENUATION OF CONTAMINANTS FLOWING THROUGH TILL

CONTAMINANT OF CONCERN(1)	ORGANIC CARBON PARTITION COEFFICIENT(2)	RETARDATION FACTOR(3)
Benzene	65	45
Chloroform	44	31
Methylene chloride	8.8	6.9
Tetrachloroethylene	364	250
Trichloroethylene	126	86
Bis(2-ethylhexyl)phthalate	2.0×10^9	1.4×10^9
PCBs(4)	1.1×10^6	7.4×10^5
PAHs(5)	5.5×10^6	3.7×10^6

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(1) Contaminant of concern are those identified in FS Table 3-18 as significant for the ground water ingestion risk scenario.

(2) The organic carbon partition coefficient is an intrinsic chemical property reflecting the tendency of the chemical to adsorb to organic carbon in solids and not leach. Values were taken from Mabey, et al. (1982).

(3) Calculated using formula for retardation (R) given in FS Appendix A, page A-21; foc = 5 percent as typical value. The retardation factor is the ratio of ground water flow velocity to the apparent contaminant migration velocity (Wilson, et al., 1981).

(4) All PCBs. Organic carbon partition coefficient is for Aroclor 1254.

(5) All carcinogenic PAHs. Organic carbon partition coefficient is for benzo-(a)-pyrene.

TABLE 4

STATISTICAL SUMMARY OF SEEP FLOW MEASUREMENTS[1]

PARAMETER	EASTERN SEEPS	WESTERN SEEPS	TOTAL
Number of measurements	6	5	11
Arithmetic mean (gpm)	71.7	41.8	113.5
Median (gpm)	66.5	39.0	105.5
Standard deviation (gpm)	45.5	8.3	-
Minimum (gpm)	8.5	34.2	42.7
Maximum (gpm)	143.0	55.1	198.1
True mean (t-interval) at 95 percent confidence limits	24.0 to 119.5	31.5 to 52.1	55.5 to 171.6

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[1] Data taken from RI Table 4-6.

TABLE 5

VELOCITY OF GROUND WATER FLOW
BEDROCK AQUIFER FLOWING TO THE BLACK RIVER

PARAMETER	UNITS	VALUE	BASIS/REFERENCE
HYDRAULIC CONDUCTIVITY	cm/sec	5.00E-05	Median value from falling-head tests (RI, Table 4-4, Page 85).
HYDRAULIC GRADIENT (CALCULATION NO. 1)			
Bedrock ground water elevation @ MW-6	ft-msl	555	Mean elevation from measurements 8/21/87 thru 3/30/88 (RI, Table 4-3, Page 82).
River water surface elevation	ft-msl	305	U.S. Department of the Interior, Geological Survey, 15-Minute Topogrpahic Quadrangle, Claremont, NH-VT, dated 1957, scale 1:62500.
Potentiometric head MW-6 to river	feet	250	Difference in head levels at MW-6 and river surface elevation.
Horizontal distance from MW-6 to river	feet	1,800	Measured from RI mapping (RI, Figure 4-1).
Hydraulic gradient	ft/ft	0.139	Calculated from potentiometric head difference and horizontal distance from MW-6 to river.

TABLE 5

(CONTINUED)

PARAMETER	UNITS	VALUE	BASIS/REFERENCE
HYDRAULIC GRADIENT (CALCULATION NO. 2)			
Bedrock ground water elevation near center of site	ft-msl	445	RI, Figures 4-3 through 4-8
Bedrock ground water elevation at MW-20	ft-msl	330	RI, Table 4-3, Page 92
Potentiometric head center of site to MW-20	feet	115	Difference in head levels
Horizontal distance from center of site to MW-20	feet	1,425	Measured from RI mapping (RI, Figure 4-1).
Hydraulic gradient	ft/ft	0.081	Calculated from potentiometric head difference and horizontal distance
Bedrock aquifer porosity	--	0.05	Mean for "fractured crystalline rock" (Freeze and Cherry, 1979; Table 2.4, Page 37).
Bedrock ground water flow velocity	ft/yr	140	Calculated from hydraulic conductivity, porosity, and gradient calculation 1.
Bedrock ground water flow velocity	ft/yr	80	Calculated from hydraulic conductivity, porosity, and gradient calculation 2.

REFERENCES

LIST OF REFERENCES

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ATTACHMENTS

ATTACHMENT 1

EVALUATION OF INHALATION RISK

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REMCOR

By MB Date 8/16/88 Subject Old Springfield Site Sheet No. 1 of 6
Inhalation Risk Proj. No. 99530.9
Chkd. By PVS Date [illegible]

PURPOSE: Perform mass balance to check accuracy of EPA emissions model for risks of inhalation

PROCEDURE:

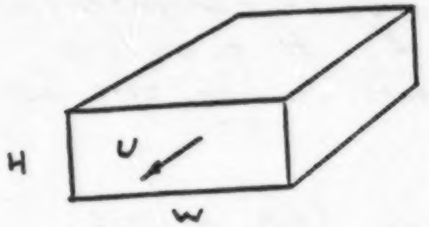
1. Use box model (EA, p. C-16) and listed airborne concentrations (EA Table 4.4) to calculate contaminant mass leaving site by air pathway
2. Use source area (EA, p. C-16), source depth, and "plausible maximum" concentrations (EA, Table 4.3) to calculate contaminant mass in landfilled waste.
3. Calculate longevity of source by comparing source mass to the rate of airborne release

REMCOR

By LMB Date 8/16/88 Subject Old Springfield Site Sheet No. 2 of 6
Inhalation Risk Proj. No. 35530.9
Chkd. By JWS Date 9/5/88

Box Model

The EPA used a "box model" to define airborne dispersion. The "size" of the box is the cross-sectional area, and the air flow is this area times the average wind speed.



$$Q = W \cdot H \cdot U$$

where Q = airflow rate, m³/sec
W = width, m
H = height of mixing, m
U = wind speed, m/sec

By the EPA model, $W = 338$ m (EA, p C-16)
The EPA did not indicate the value of H.
As a conservative value, assume that $H = 3.05$ m
i.e., there is no vertical mixing above about 10 ft
Take U as the average annual wind speed at Burlington, VT as was done in the EA (p. C-14)
This wind speed is 8.9 mph [Ref 1]

$$Q = (338\ \text{m})(3.05\ \text{m})(8.9\ \text{mph})\left(\frac{0.447\ \text{m/sec}}{\text{mph}}\right)$$

$$Q = 4{,}100\ \text{m}^3/\text{sec}$$

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[1] US Department of Commerce, "Local Climatological Data, Burlington, VT, period of record = 1941 through 1970, NOAA/NCC, Asheville, NC

By LMB Date 8/16/85 Subject Old Sainsfield Site Sheet No. 3 of 5
Chkd. By PYS Date 8/18/85 Inhalation Risk Proj. No. 835309

The flow of contaminants leaving the site can then be calculated as follows:

$$M_A = \chi_i \cdot Q$$

where M_A = mass flow rate, mg/sec
χ_i = air concentration, mg/m³
Q = airflow rate, m³/sec

The following table presents the "plausible maximum case" concentrations of contaminants of concern (EA Table 4-4) and calculates mass flow rates, (only those contaminants with corresponding risk > 10^{-4} are listed)

Contaminant	χ_a (mg/m³)	M_a (mg/sec)
Benzene	9.32×10^{-2}	382
Chloroform	8.92×10^{-2}	366
TCE	8.70×10^{-2}	357

REMCOR

By UMB Date 8/16/88 Subject Old Springfield Site Sheet No. 4 of 6
Inhalation Risk Proj. No. 88520.9
Chkd. By FJS Date [illegible]

Source Strength

The available quantities for vaporization of contaminants can be examined by the area, thickness, unit weight, and contaminant concentrations in the source.

The area of the source is given in the EA as 12,040 m^2 (p. C-16). The thickness of the source is not given. The soil concentrations applied by the EPA model were all found in the uppermost 2.5 ft of soil (EA Appendix A Table A-1 and EA Table 4-3).

The unit weight of soil is taken as 120 lbs/ft^3 (reasonable but consevative).

The mass of affected soil in the source area is then calculated as follows:

$$S = A \cdot T \cdot \gamma$$

where S = soil mass, kg
A = source area, m^2
T = source thickness, m
γ = unit wt, kg/m^3

REMCOR

By MB Date 3/16/89 Subject Old Springfield Site Sheet No. 5 of 6
Inhalation Risk Proj. No. 88530.9
Chkd. By PJS Date 8/7/89

Therefore

$$S = (12040\ m^2)(2.5\ ft)\left(120\ \frac{\cancel{lbs}}{\cancel{ft^3}}\right)\left(\frac{1\ kg}{2.20\ \cancel{lb}}\right)\left(\frac{3.28\ ft}{\cancel{m}}\right)^2$$

$$S = 1.77 \times 10^7\ kg$$

The quantities of key contaminants are then calculated using the following equation:

$$M_s = X_s \cdot S$$

M_s = mass in soil, mg
X_s = soil concentration, mg/kg
S = soil mass, kg

The following table presents "plausible maximum case" soil concentrations of contaminants of concern (EA Table 4-3) and calculates masses in soil

Contaminant	X_s (mg/kg)	M_s (mg)
Benzene	5.60	9.89×10^7
Chloroform	0.380	6.71×10^6
TCE	5.60	9.89×10^7

REMCOR

By MB Date 8/16/88 Subject Old Springfield Site Sheet No. 6 of 6
Chkd. By [illegible] Date [illegible] Inhalation Risk Proj. No. 88530.9

Source Longevity

Source longevity can now be calculated for each contaminant by the following equation:

$$L = \frac{M_s}{M_a}$$

L = longevity, sec

The following table presents these calculations

Contaminant	M_s (mg)	M_a (mg/sec)	L (sec)	L (hours)
Benzene	9.89×10^7	382	2.59×10^5	71.9
Chloroform	6.71×10^6	366	1.83×10^4	5.09
TCE	9.89×10^7	357	2.77×10^5	77.0

Conclusion

Even with very conservative input data, the EPA model would predict that all of the contaminants of concern would be depleted from the source area in 77 hours. This is not consistent with the 70-year exposure assumption. At the very minimum, the EPA risk calculation is wrong because of their emissions model.

ATTACHMENT 2

RESUMES

LEO M. BRAUSCH
VICE PRESIDENT

EDUCATION

M.S., 1976, Civil and Environmental Engineering, University of Cincinnati

B.S.C.E., 1975, Civil and Environmental Engineering, University of Cincinnati

REGISTRATION

Professional Engineer: Mississippi, New Mexico, Ohio, Pennsylvania, South Carolina

Emergency Medical Technician: Pennsylvania

PROFESSIONAL EXPERIENCE

1985 to Present: Mr. Brausch is Vice President of Remcor in responsible charge of the Engineering and Project Development Division. In this role, he has served as the director and key technical contributor for approximately 100 site investigation and site cleanup projects. Examples of key experiences follows:

- Investigation and subsequent cleanup of a 90-acre industrial complex in western Pennsylvania. This project involved the assessment of contamination and design and implementation of remedial measures associated with: polychlorinated biphenyl (PCB) decontamination of plant buildings, equipment, and process sewers; closure of a former PCB waste disposal area; decontamination and closure of electroplating facilities; and plant-wide removal of asbestos-containing materials.
- Subsurface investigations and design of cleanup programs associated with petroleum hydrocarbon (PHC) contamination at two sites in New Jersey. Work involved assessing contamination from leaking underground storage tanks, spills, and other sources. Remedial measures evaluated include free product recovery, ground water treatment, tank removal, tank closure, bioreclamation, and slurry wall containment.

- Remedial investigation/feasibility study (RI/FS) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of a six-acre landfill containing an estimated 100,000 cubic yards of PCB-contaminated materials. After extensive site studies, three technically feasible, cost-effective remedial alternatives were developed.

- The Resource Conservation and Recovery Act (RCRA) closure plan development and implementation for five surface impoundments containing 8,000 cubic yards of electroplating sludge at a site in Mississippi. The closure involves on-site dewatering of the sludge, in-situ containment of contaminated soils, and ground water recovery/treatment. In addition, potential continuing releases from other on-site solid waste management units (SWMUs) are being investigated.

- Subsurface investigations of volatile organic contamination associated with former drummed and bulk solvent disposal areas and underground solvent storage tanks at five industrial plant sites. The investigations included borings, soil and ground water testing, and use of an organic vapor analyzer to determine the presence of subsurface volatile organic contamination.

Mr. Brausch has also served as an expert witness. For a major civil action involving PCB contamination of five industrial facilities in three states, Mr. Brausch testified relative to contamination assessment methods, decontamination procedures and costs, and PCB transport mechanisms and pathways in interior settings. In adjudicatory hearings for a proposed hazardous waste landfill in Ohio, Mr. Brausch addressed design, construction, operational, and closure issues.

1980 to 1985: Mr. Brausch served as the Manager of Project Development for IT Corporation in Pittsburgh, Pennsylvania (formerly D'Appolonia Waste Management Services). His primary role was in the planning and development of remedial response programs for formerly utilized waste disposal sites. Representative experiences included the following:

- Project manager for the investigation of the degree and extent of PCB contamination at seven facility locations in five states. These projects included development and execution of investigation programs, evaluation of alternative decontamination technologies, and preparation of detailed decontamination plans and cost estimates.

JOHN A. GEORGE
PROJECT MANAGER

EDUCATION

M.S., 1976, Terrestrial Ecology, Clarion University of Pennsylvania

B.S., 1975, Biology, Clarion University of Pennsylvania

PROFESSIONAL EXPERIENCE

1987 to Present: Mr. George joined Remcor in 1987 as a Senior Scientist in the Engineering and Project Development Division. As Manager of the Geosciences Group, Mr. George is responsible for project scheduling, budgetary control, resource allocation, technical direction, review of deliverables, and client liaison. The Geosciences Group is primarily responsible for site characterization, especially in the area of ground water contamination assessment. The Group also participates in remedial alternative evaluation.

Mr. George is presently managing a remedial investigation/feasibility study (RI/FS) focusing on volatile organic ground water contamination at a National Priority List site near Allentown, Pennsylvania. This RI/FS is being conducted by Remcor on behalf of the potentially responsible party. Mr. George has participated in numerous site characterization efforts. Included among these are studies of waste management units at electronics components manufacturing facilities and abandoned steelmaking facilities, and wastewater settling lagoons at a primary aluminum reduction facility. He was also one of the principal authors of a Remcor study of potential effects of the U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) Corrective Action Program on the domestic steel industry. This in-depth study was performed for the American Iron and Steel Institute (AISI).

1982 to 1987: Mr. George served as a Project Manager in the Waste Management Services Division of NUS Corporation in Pittsburgh, Pennsylvania. During much of this period NUS was the prime contractor to the EPA for Remedial Planning and Field Investigation Team (FIT) support for the Superfund Program. Mr. George participated in several RI/FSs at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites, both technically and in a managerial role. The following provides a representative listing of project experience:

- Groveland Wells Site, Groveland, Massachusetts

  Project Manager - RI/FS for 820-acre municipal wellfield in northeastern Massachusetts contaminated with volatile organics, principally trichloroethylene (TCE).

- Charles George Land Reclamation Trust Landfill Site, Tyngsboro, Massachusetts

  Project Manager - RI/FS for 70-acre municipal and industrial waste landfill in northeastern Massachusetts overlying contaminated fractured bedrock aquifer tapped by domestic wells; total landfill volume approximately four million cubic yards.

- Cannon Engineering/Plymouth Site, Plymouth, Massachusetts

  Technical Lead - Wetlands and Floodplain Assessment in support of Feasibility Study.

- Drake Chemical Site, Lock Haven, Pennsylvania

  Technical Lead - Assessment of vegetative stress due to discharge of herbicides from a former manufacturing facility.

- Sullivan's Ledge Site, New Bedford, Massachusetts

  Project Manager - RI/FS for volatile organic/polychlorinated biphenyl (PCB)/metals disposal in abandoned quarry pits.

- Leetown Pesticide Site, Leetown, West Virginia

  Project Manager - RI/FS for evaluation of 2.5-square mile watershed contaminated through indiscriminant disposal of pesticides and the use of agrichemicals.

- Leetown Pesticide Site, Leetown, West Virginia

  Project Manager - Bench Scale Treatability Study of Microbial Degradation of Pesticides by Indigenous Soil Microbes.

1980 to 1982: Mr. George served as Director of Mining Services with Penn Environmental Consultants (acquired by NUS Corporation in 1981), supervising a staff that provided complete engineering and permitting services to several moderate-sized Appalachian surface mining interests.

1979 to 1980: Mr. George served as a principal investigator with Michael Baker Corporation, Beaver, Pennsylvania. His responsibilities involved environmental assessments for utility line construction and development of environmental baseline data for mining operations.

1977 to 1979: Mr. George served as Supervisor of the Land Stabilization and Reclamation Program (Surface Mining Reclamation) at Belmont Technical College, St. Clairsville, Ohio.

- Project manager for the preparation of a RCRA closure plan for a formerly used secondary lead smelter site in Florida. The project involved a comprehensive contamination survey, subsurface exploration, and ground water monitoring. Mr. Brausch headed the design team for waste removal, facility decontamination, and ground water treatment aspects of the closure.
- Project director for the preparation of the RCRA closure plan for two lagoons (containing nearly 100,000 cubic yards of mixed organic and inorganic sludges) at a plant site in southern Ohio. The closure plan calls for dewatering and physical stabilization of sludges preparatory to on-site containment.

In addition to such assignments, Mr. Brausch served as an in-house consultant in health and safety programs; air quality monitoring during waste site cleanup; and waste analysis, manifesting, transportation, and disposal.

1978 to 1980: Mr. Brausch served as the Lead Engineer, Environmental Issues, for the environmental and safety analysis of the Waste Isolation Pilot Plant (WIPP) proposed for a site east of Carlsbad, New Mexico. This position involved coordinating and leading investigations attendant to all environmental permits, approvals, and compliances required for this radioactive waste storage/disposal facility.

1976 to 1978: Mr. Brausch served as a project leader and technical contributor on interdisciplinary environmental investigations and engineering designs. His principal involvement was in environmental permitting and the design of pollution control facilities. Representative technical tasks and responsibilities included air quality and meteorological monitoring, preparation of emission inventories, and evaluations of control technologies for new-source air quality permitting. Mr. Brausch also prepared the process, hydraulic, and structural design of industrial wastewater treatment facilities. Key issues in the treatment schemes included the design and economic analysis of alternative treatment schemes (e.g., precipitation/clarification, ion exchange, biological); conveyance and disposal of metal hydroxide and organic sludges; and plant start-up, operation, and maintenance.

1972 to 1976: Prior to receiving his degrees, Mr. Brausch worked part time as an engineering technician in wastewater treatment design, highway planning, and surveying.

PUBLICATIONS AND PRESENTATIONS

Husak, A. D., L. M. Brausch, and B. P. Bundy, 1985, "Recent Experiences in Waste Site Remedial Action," Symposium Proceedings, American Institute of Chemical Engineers 1985 Spring National Meeting, March 25 through 28, Houston, Texas.

Brausch, L. M. and J. S. Lewis, Jr., 1984, "Case Study: Leachate Containment System Installation, Lipari Landfill, Pitman, New Jersey," Superfund Update: Cleanup Lessons Learned, symposium sponsored by Center for Energy and Environmental Management, May 21 and 22, Denver, Colorado.

Brausch, L. M., 1984, "Advances in Ground Water Treatment Technology," General Electric Environmental Protection Seminar, April 25 through 27, Philadelphia, Pennsylvania.

Brausch, L. M., 1983, "Implementation of Remedial Action Program, Enterprise Avenue Site," Proceedings, Conference on the Disposal of Solid, Liquid, and Hazardous Wastes, American Society of Civil Engineers, April 28 and 29, Bethlehem, Pennsylvania.

Brausch, L. M., 1982, "Siting and Design of Hazardous Waste Landfills," Hazardous Wastes Generation and Management Conference, June 9 and 10, 1982, Pittsburgh, Pennsylvania.

Brausch, L. M., 1982, "Design and Construction of Landfills for Hazardous Wastes," International Conference on Technology and Technology Exchange, May 3 through 6, 1982, Pittsburgh, Pennsylvania.

Hohmann, G. L. and L. M. Brausch, 1981, "Environmental Impact and Protection for the Waste Isolation Pilot Plant (WIPP)," Waste Management '81, American Nuclear Society Topical Meeting, Tuscon, Arizona.

Laushey, L. M. and L. M. Brausch, 1979, "The Geometrics of Rill Formation on Hillsides," Proceedings of the XVIII Congress of the IAHR, International Associated for Hydraulic Research, Caligari, Italy.

Brausch, L. M., 1976, "Observations on Rill Pattern Development," Master's Thesis, University of Cincinnati, Cincinnati, Ohio.

PREVIOUS PROFESSIONAL AFFILIATIONS

American Chemistry Society
American Institute of Biological Sciences
Pennsylvania Mining Professionals (Vice President, 1981/1982)
Soil Conservation Society of America

PUBLICATIONS

Hubbard, A. E., J. A. George, R. Hubbard, and W. Hagel, 1986, "Quantitative Risk Assessment as the Basis for Definition of Extent of Remedial Action at the Leetown Pesticide Superfund Site," Presented at the HMCRI Superfund '86 Conference, Washington, DC.

George, J. A., 1982, "Erosion and Sedimentation Control Alternatives - Surface Mining in Northern Appalachia," presented at the Fifth Annual Meeting of the Water Pollution Control Association of Pennsylvania, Pittsburgh, Pennsylvania.

George, J. A., 1976, *Seasonal Weight and Activity Relationships in a Free-Ranging Population of the Eastern Chipmunk (Tamias striatus) Rodentia: Sciuridae*, Master's Thesis, Clarion State College.

WILLIAM E. ROSENBAUM
PROJECT MANAGER

EDUCATION

M.S., 1983, Business Administration, Robert Morris College

B.S., 1974, Civil Engineering, University of Notre Dame

REGISTRATION

Professional Engineer: Pennsylvania

Certified Sewage Treatment Plant Operator: Pennsylvania

Certified Waterworks Operator: Pennsylvania

PROFESSIONAL EXPERIENCE

1987 to Present: Mr. Rosenbaum joined Remcor as a Project Manager in the Engineering Design Group. His responsibilities include project management and key technical contributions related to remedial action design. His project experience at Remcor includes:

- Design of modifications to the closure of a series of hazardous waste holding lagoons to optimize the design, reduce construction costs, and expedite completion of the closure.

- Development of a work plan for the site stabilization of a former metals processing facility. The site was contaminated with radioactive thorium and heavy metals.

- Preparation of plans and specifications for the upgrade of the hazardous waste landfill owned and operated by a major chemical manufacturer. The project included design of a double-lined leachate basin, capping of a portion of the landfill, and upgrade of the drainage and leachate collection system.

- Preparation of remedial investigation/feasibility studies (RI/FSs) for three manufacturing facilities contaminated with polychlorinated biphenyls (PCBs). Selected remediation activities included surface cleaning, concrete milling, and building subsoil excavation.

1981 to 1987: Mr. Rosenbaum served as a Senior Engineer and Assistant Engineering Manager responsible for the Environmental Design Group of Baker/TSA Inc. As Assistant Engineering Manager, he managed a group of 18 engineers and technicians and was responsible for the following:

- Technical quality control.
- Personnel performance reviews.
- Preparation of proposals.
- Budgetary control of design projects.

His major project experience at Baker/TSA Inc. included the following:

- Project Manager for grading and capping of a hazardous waste landfill in New Jersey. The project included regrading, installation of waterways, leachate collection system, gas vents, and low-permeability soil cap. Total construction cost of the grading and capping project was $4.5 million.
- Design Manager for the preparation of plans, specifications, operations and permitting for radiological contamination removal in Essex County, New Jersey. Project budget was $12 million and required the preparation of detailed plans and specifications in six weeks. The project included contracts for construction, transportation and disposal and involved resident relocation, radiological health and safety procedures, public relations, and utility coordination.
- Project Engineer for the preparation of plans and specifications for the closure of a hazardous waste landfill owned and operated by a major steel company. The project included regrading, installation of a clay cap, leachate, and runoff piping.
- Project Engineer for the preparation of plans and specifications for the design of a fly ash disposal landfill located on the banks of the Ohio River.
- Developed, for a major steel corporation, portions of a Comprehensive Hazardous Waste Management Plan dealing with wastewater treatment, storage, and disposal. The plan reviewed options and developed alternatives to economically comply with hazardous waste and National Pollution Discharge Elimination System (NPDES) regulations. Alternatives reviewed included recycle/reuse, operations and process modifications and waste reduction measures.

- Designed and supervised preparation of drawings and specifications for a wastewater treatment facility to store and treat runoff from a 35-acre coal handling facility in Ashtabula, Ohio. The project included an equalization lagoon constructed at lake level using slurry wall technology.

1977 to 1981: Mr. Rosenbaum served as a Process Project Engineer for The Chester Engineers, Inc., Coraopolis, Pennsylvania, where his duties included the following:

- Design Manager for the excavation and removal of a sanitary landfill in New Jersey. The landfill consisted of approximately 20,000 cubic yards of municipal sanitary waste. Out-of-state disposal was selected by the state for final disposition of the waste.

- Supervising facility design projects for various industries, including the design and construction of hazardous waste handling facilities in compliance with Resource Conservation and Recovery Act (RCRA) requirements.

- Obtaining permits from state and federal agencies.

- Preparation of itemized construction cost estimates and in-house construction supervision.

Following is a summary of Mr. Rosenbaum's major project experience:

- Designed and provided general inspection services for the construction of a double lined-hazardous waste holding lagoon for a major electronics manufacturer. The facility included two, one-million gallon compartments each equipped with a double liner with intermediate leak detection and collection system. All piping to and from the facility was installed in a casing pipe with a separate leak collection system.

- Project manager for the $5 million addition to the wastewater treatment facility owned by a heavy equipment manufacturer in Illinois. The project included API separation, clarification, thickening, vacuum filtration, shallow bed sand filtration, and chrome treatment.

- Lead project engineer for the design of additions to an existing treatment facility owned by a manufacturer of electronic components. The system, designed for the treatment of ion exchange spent regenerate, including softening, reverse osmosis, and double-lined solar evaporation ponds.

- Lead project engineer for the design of a batch treatment system to remove arsenic and selenium from rinse waters generated in the manufacture of copy equipment. The system was designed around a process utilizing activated alumina.

1976 to 1977: Mr. Rosenbaum served as a Resident Engineer for Black and Veatch Consulting Engineers. His responsibilities included construction supervision for the purpose of assuring compliance with plans and specifications and surveying.

1974 to 1976: Mr. Rosenbaum served with U.S. Air Force, 351st Strategic Missile Wing as a Missile Launch Officer.

PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers
American Water Works Association
Water Pollution Control Federation

ANDRZEJ NAZAR
SENIOR HYDROGEOLOGIST

EDUCATION

M.S., 1962, Geology, Academy of Mining and Metallurgy, Cracow, Poland
Specialization: Hydrogeology and Engineering Geology

REGISTRATION

Certified Professional Geologist: North Carolina
Certified Professional Geological Scientist: United States
Professional Engineer: West Germany
Professional Engineer, Geotechnical Engineering: Poland
Professional Engineer, Hydrogeology: Poland

PROFESSIONAL EXPERIENCE

1987 to Present: Mr. Nazar joined Remcor as a Senior Hydrogeologist. In this position, he is responsible for project planning, senior technical review, development of field investigative procedures, and direction of activities of staff geologists and hydrogeologists.

1981 to 1987: Mr. Nazar served as a Principal Hydrogeologist and manager of the Earth Science Group at NUS Corporation (NUS), Pittsburgh, Pennsylvania. He served as a technical advisor to management for the oversight and review of hydrogeological investigations at privately-owned waste disposal facilities and at uncontrolled hazardous waste sites and contaminated municipal wellfields under the U.S. Environmental Protection Agency (EPA) Superfund Program. He was also involved in the recommendation and review of geotechnical engineering feasibility studies for the remediation of surface and ground water contamination and for the Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act (RCRA/CERCLA) planning and management.

While at NUS, Mr. Nazar managed a staff of more than 20 geologists, hydrogeologists, geophysicists, geochemists, and geotechnical engineers, performing subsurface investigations at hazardous waste sites, landfills, wellfields, surface and deep mines, fly ash and coal refuse sites, and petroleum tank farms. He was ultimately responsible for technical job quality, project budgeting, scheduling, and staffing, and conducted on-site technical supervision and staff training at projects in the field.

1978 to 1980: Mr. Nazar served as an engineer with Frankland and Lienhard Consultants, New York, New York. He was principally involved in the design of drainage systems for highways and roads and evaluated geotechnical conditions for highway construction projects.

1967 to 1976: Mr. Nazar directed and supervised the technical and administrative activities of the Mining Department at the Research Center of Mining Technology, Cracow, Poland. He was responsible for project management, budget control, client contact, and business development. He directed programs in environmental geology and hydrogeology for public work facilities, industrial installations, and mining operations, and was responsible for conducting ground water exploration programs and ground water studies for water supply and mining projects. He managed a field office consisting of a technical staff of more than 100 personnel, specializing in the area of sulfur recovery mines. Responsibilities included drilling supervision, staff inspection, and development and coordination of injection and production well sites for the maximum recovery of sulfur from the deposit. He conducted research on the determination of geothermal conditions of ground water reservoirs in sulfur deposits and evaluated the environmental impact of mining on regional ground water flow and quality.

1962 to 1967: Mr. Nazar served as Senior Hydrogeologist/Hydrogeologist for Hydrogeological Engineering Consulting, Inc., Cracow, Poland. He designed and supervised several projects for the dewatering of open pit mines, and conducted supply projects to define aquifer characteristics and ground water quality, and evaluated the impact of proposed withdrawals on adjacent water supplies. He also designed water wells and supervised well drilling and installation, pumping tests, piezometer tests, and pressure-head tests. Mr. Nazar supervised geotechnical investigations for dams, power plants, and mining and performed surface geologic mapping for reservoir siting studies.

PROFESSIONAL AFFILIATIONS

American Institute of Professional Geologists
National Water Well Association

PATENTS

A New Mixture for Plugging the Hot Water Outflows from Sulfur Recovery Wells, Nr. P. 158 398, Poland, 10, 20, 1972.

A New Technique for Plugging the Hot Water Outflows from Sulfur Recovery Wells, Nr. P. 146 772, Poland, 3, 9, 1971.

PUBLICATIONS AND PRESENTATIONS

Orient, J., A. Nazar, and R. Rice, 1986, "Vacuum and Pressure Test, Methods for Estimating Hydraulic Conductivity," Monitoring Review.

Prieur, J., A. Nazar, and A. Rechnagel, 1986, "Performance of Aquifer Evaluation Testing at Uncontrolled Hazardous Waste Sites," presented at the International Symposium on Management of Hazardous Chemical Waste Sites, Winston-Salem, North Carolina.

Nazar, A., D. Threlfall, and L. Casper, 1985, "Groundwater Protection," 1985, Pennsylvania Natural Gas Producer.

Dowiak, M. and A. Nazar, 1984, "Assessment of Groundwater Contamination and Remedial Action for a Hazardous Waste Facility in a Coal Mine Region in Southwestern Pennsylvania", presented at the National Conference on Management of Uncontrolled Hazardous Waste Sites, Washington, DC.

Nazar, A., J. Prieur, and D. Threlfall, 1984, "Use of Multi-level Gas Driven Samplers and Conventional Monitoring Wells for Evaluation of Groundwater Contamination at an Uncontrolled Hazardous Waste Site," presented at the Seventh Annual Madison Waste Conference sponsored by the University of Wisconsin, Madison, Wisconsin.

Nazar, A., J. Prieur, and D. Threlfall, 1984, "Integrated Groundwater Monitoring Program Using Multi-Level Gas Driven Samplers and Conventional Monitoring Wells at an Uncontrolled Hazardous Waste Site," Monitoring Review.

Dowiak, M. J., R. A. Lucas, A. Nazar, and D. Threlfall, 1982, "Selection, Installation, and Post-Closure Monitoring of a Low Permeability Cover over a Hazardous Waste Disposal Facility," presented at the National Conference on Management of Uncontrolled Hazardous Waste Sites, Washington, DC.

Onderka, W. and A. Nazar, 1973, "Techniques of Prevention of Geysers and Outflows of Hot Intermediate Water from Sulfur Deposit to the Surface in Sulfur Recovering Mines Using Modified Frasch Process," Bezpeiczenstwo Pracy w Gornctwie, No. 1, Poland.

Nazar, A. and J. Wilk, 1970, "Decompression of Sulfur Deposit as a Factor for Increasing Production of Sulfur in Mines, Using Modified Frasch Process," Gornicze Surowce Chemiczne, No. 4, Poland.

Nazar, A. and J. Wilk, 1969, "Distribution of Temperatures in Sulfur Deposit as the Result of Sulfur Recovering by Drilling Method Based on Hydrogeological Investigations," Gornicze Surowce Chemicze, No. 2, Poland.

Nazar, A., A. Nazarowa, and J. Wilk, 1969, "Biological Overgrowth of Well Screens," Technika Poszukiwan, No. 29, Poland.

SCOTT J. McDOUGALL
PROJECT GEOLOGIST

EDUCATION

B.S., 1978, Environmental Science and Resource Management in Geology, Lehigh University

Continuing Education, 1978 to present, in hazardous waste site investigation and cleanup, ground water monitoring, computer modeling, RCRA, CERCLA, SARA, and OSHA regulations, and underground storage tanks

REGISTRATION

Professional Geologist: North Carolina

PROFESSIONAL EXPERIENCE

1987 to Present: Mr. McDougall is a Project Geologist for Remcor. To date, he has been collecting and analyzing aquifer test data and is designing a ground water recovery system as part of the closure of an electroplating sludge disposal lagoon site in Mississippi.

Mr. McDougall joined Remcor with nine years of environmental experience, primarily in the technical evaluation and management of waste disposal site investigations.

1983 to 1987: Mr. McDougall served as a Project Manager and Senior Hydrogeologist for NUS Corporation, where he conducted and managed remedial investigations and feasibility studies (RI/FSs) at hazardous waste sites listed on the U.S. Environmental Protection Agency (EPA) Superfund list and at privately owned facilities. Representative experience included the following:

- Project Manager and Senior Hydrogeologist for two EPA Superfund enforcement support projects in Puerto Rico in which responsible party site investigations were monitored and evaluated on a full-time basis. One site is a municipal wellfield contaminated by solvents from a leaking lagoon; the other is a residential area contaminated with mercury from an adjacent landfill.

- Project manager for remedial activities conducted at an abandoned pesticide disposal lagoon site located in western Tennessee consisting of nine lagoons. Program involved fast-track drilling and monitoring well installation; aquifer testing, soil, sediment, ground water, surface water, and drinking water sampling; and geophysics. Responsible for technical coordination, site risk assessment, and recommendation of cleanup alternatives, as well as schedule and budget control and client coordination. The site was investigated for less than the original budget and schedule estimates.

- Served as Supervisor of the Geophysics and Engineering Geology Department for one year and was responsible for field crews performing investigations at Superfund sites.
- Prepared a Resource Conservation and Recovery Act (RCRA) ground water assessment report as part of the closure of an electric arc furnace dust site for a steel manufacturer in western Pennsylvania.
- Project geologist for first Superfund RI/FS conducted in Puerto Rico. This involved a drilling and sampling program to locate the source of municipal wellfield contamination in a densely industrialized area within a complex limestone hydrogeologic setting. Because of careful planning, the source was identified during the first phase of the project, resulting in a cost savings.
- Conducted detailed on-site hydrological and sampling investigations at Superfund hazardous waste sites in Delaware, Massachusetts, and Pennsylvania.
- Served as lead author in the preparation of Remedial Action Master Plans and performed technical site inspections and work plan preparation for hazardous waste sites in Delaware, Massachusetts, New Jersey, New York, Pennsylvania, Puerto Rico, Rhode Island, Tennessee, and Vermont. Managed engineering subcontractors performing site evaluations. Prepared numerous well drilling contracts and selected and managed drilling subcontractors.
- Served as hydrogeologist for environmental assessments at gasoline stations for a major oil company. Specific activities conducted were test boring drilling and subsurface soil sampling adjacent to leaking underground storage tanks for stations located in Florida, Georgia, and Tennessee.

1980 to 1983: Mr. McDougall held the position of Regional Hydrogeologist with the Pennsylvania Department of Environmental Resources (PADER) and performed ground water and surface water investigations and recommended pollution abatement methods at approximately 50 sites. These sites included hazardous waste facilities; municipal landfills; sewage and septic sludge disposal sites; fly ash, coal refuse, and deep mine drainage sites; and private and municipal wellfields. Responsible for the review of new landfill, sludge disposal, and hazardous waste site (RCRA Part B) permit applications and remedial action designs and site closure plans under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulations.

1978 to 1980: Mr. McDougall was an Environmental Specialist with GAI Consultants, Inc. where he assisted in the supervision of an extensive river navigability study of the State of Michigan for the U.S. Army Corps of Engineers. Other projects included researching for and preparing of portions of a fly ash disposal guidance manual for the Electric Power Research Institute, preparing environmental impact statements for Tennessee Valley Authority electric power station projects, and conducting field permeability tests at a fly ash disposal site.

JOHN P. BLACK, P.E.
PROJECT ENGINEER

EDUCATION

M.S., 1979, Civil Engineering, State University of New York at Buffalo

B.S., 1977, Civil Engineering, State University of New York at Buffalo

A.A.S., 1975, Engineering Science, Erie Community College

Transport of Immiscible Fluids in the Subsurface, by J.W. Mercer, NWWA, Baltimore, Maryland
Special Topics in Geotechnical Engineering, by D. Sangray, Carnegie-Mellon University, Pittsburgh, Pennsylvania
Groundwater Transport Modeling, by G.F. Pinder, Princeton University, Princeton, New Jersey
Loss Prevention, ASFE, Washington, DC

REGISTRATION

Professional Engineer: New York, Pennsylvania

PROFESSIONAL EXPERIENCE

1988 to Present: Mr. Black joined Remcor as a Project Engineer in the Engineering and Design Group. His responsibilities in this role include providing geotechnical and civil engineering input to the design and constructibility evaluation of remediation projects.

1980 to 1988: Prior to joining Remcor, Mr. Black was employed by D'Appolonia Consulting Engineers, Inc. (D'Appolonia) and had been involved in projects ranging from slope stabilization projects to the design of a 500,000-cubic meter underground storage facility. The main areas of Mr. Black's expertise have been associated with the analysis and design of structures that are related to the engineering behavior of soil and rock, hydrologic and hydraulic analysis of civil engineering structure, and the design and utilization of underground space. Projects which Mr. Black had been involved with, under the following categories, while with D'Appolonia include:

- Water Resources:
  - Planning and development of construction specifications for the excavation and closure of two mill sludge lagoons on the Ohio River.
  - Ground water modeling for paper sludge lagoons near Green Bay, Wisconsin. These models were

used to design a slurry wall/gradient control system to limit migration of chlorides.

- Layout and evaluation of conceptual hydroelectric power facilities on the Betsiboka River, Ambodiroka, Madagascar. Mr. Black's responsibilities on this project included evaluation of alternate component layouts, conceptual design of the sedimentation and diversion channels, and analysis of river flow profiles for the extreme discharges.

- Evaluation of the seepage and deformation behavior of a 180-foot high arch-gravity dam near Robbinsville, North Carolina.

- Preparation of permit application for the proposed 15-megawatt hydroelectric facility on the Youghiogheny Lake Dam. Mr. Black's responsibilities on this project included layout and evaluation of the powerhouse and penstock. In addition, his responsibilities included coordination of the environmental studies and all contacts and responses with the regulatory agencies.

- Evaluation of the effects of long-term dewatering on adjacent structures, of historical significance, for the Theater District project in Milwaukee, Wisconsin.

- Evaluation of the consequences of failure of any one, or a combination of, three dams in the Hoosier National Forest, Indiana. Mr. Black's responsibiltiies included dam inspection, evaluation of the stream channels, collected and evaluation of the hydrologic data, and all flood routings needed to assess the damage potential.

- Development of an inundation map for the Woronoco Dam near Westfield, Massachusetts. For this project Mr. Black evaluated the limits of flooding, which would result from the failure of a concrete gravity dam. Mr. Black conducted all of the field and office studies necessary for the completion of this project.

- Slope Stabilization and Remediation

  - Designed a slope stabilization system for a hillside conveyor system that had moved out of its proper alignment.

- Design of cut-and-fill slopes for the development of a mine haul road on an unstable hillside in Greene County, Pennsylvania.

- Design of rock cut slopes and fill slopes for development of the proposed SRC II Facility in Morgantown, West Virginia.

- Subsurface exploration, design, and construction document preparation for the remediation of a 20-acre landslide, which moved 1,300 feet of the Conrail Railroad tracks into the Ohio River.

- Evaluation and redesign of a mine spoil disposal facility failure in Belcher, West Virginia. the failure of this facility resulted in spoil materials "flowing" into homes more than 2,500 feet from the initial disposal site.

- Stabilization of a hillside with approximately 100 private residences in Wheeling, West Virginia. This project involved stabilizing the hillside, four roadways, and approximately 100 houses with minimum disruption to normal activities.

• Mine Waste Disposal

- Development and consultation during implementation of an alternative coal refuse disposal plan for existing coal refuse disposal embankments, which were operating inefficiently. The alternative plan, now in use, included the development of a large dam built of coal refuse to impound a slurry of fine coal processing waste.

- Evaluation of the mining sequence and resulting spoil pile stabilization requirements for an oil shale mining project in Queensland, Australia. On this project Mr. Black evaluated the proposed mining sequence in relation to the resulting mine tailings and spoil pile stability considerations.

- Development of reclamation plans, construction specifications, and cost estimates for two abandoned mine sites in Indiana. Primary responsibilities included planning for laboratory testing of soil and water samples, hydrologic and geotechnical designs, and report preparation.

- Design of surface drainage and sediment control systems including dams and drainage channels for several coal refuse disposal facilities in the Appalachian region.

- Underground Space

  - Layout and development of the excavation method and sequence for a large underground storage facility in the Middle East. Mr. Black was involved in the selection of the storage gallery layout, gallery support system design, access tunnel arrangements, construction methods and equipment, and the development of the construction sequence and schedule.

  - Development, supervision, and report preparation for a rock testing program conducted within the outlet tunnel of the John W. Flannagan Dam near Haysi, Virginia.

  - Subsurface exploration and evaluation of a proposed sewage conveyance tunnel in Morgantown, West Virginia. Mr. Black's responsibilities on this project involved evaluation of the proposed tunnel routes, development and execution of a subsurface exploration program, and evaluation and presentation of the data in reference to the proposed construction. The evaluation of geotechnical data included development of design parameters for lining design and a presentation of the impacts of the conditions on the proposed construction.

  - Analysis of a distressed raw coal reclaim tunnel and compilation of alternative rehabilitation and replacement schemes. Mr. Black's responsibilities on this project included field evaluation of the condition of the tunnel, development of six alternative repair or replacement schemes, and cost analyses of each alternative.

  - Development of remediation plans for a site on which leakage from underground storage tanks had created the potential for off-site ground water contamination.

1979 to 1980: Prior to joining D'Appolonia, Mr. Black was employed by Delon Hampton and Associates, Chartered of Silver Spring, Maryland. Delon Hampton and Associates is a consulting engineering firm which is involved mainly in transportation-related projects such as tunnels, bridges, airports, and planning. Mr. Black was involved in geotechnical search, design, and recommendations in support of the structural design group. The scope of this work included:

- Research into the use of geotechnical instrumentation for design and construction of both soft ground and rock tunnels. Mr. Black was involved in the evaluation of the use of instrumentation to provide real-time performance data for improvement of urban tunneling.
- Research on the influence of geotechnical parameters in tunnel lining design. Various methods of improving tunnel design and construction through improved pre-construction geotechnical exploration.
- Site investigation, analysis, and design of three projects at Washington National Airport. This included layout of the geotechnical site investigation, analysis of the data, and the design of taxiways, aprons, and ramps for aircraft.
- Preliminary investigations into the causes of premature deterioration of reinforced concrete bridge decks.

1977 to 1979: During the completion of his Master of Science Degree, Mr. Black worked for Faculty Technical Consultants (FTC) in Buffalo, New York. His responsibilities at FTC included the calibration, installation, and monitoring of approximately 100 instruments utilized to evaluate the behavior of a long-span corrugated metal culvert in Bucks County, Pennsylvania. The field testing for this project included plate load tests, deformation, and stress measurements.

PROFESSIONAL AFFILIATIONS

Chi Epsilon, National Honorary Civil Engineering Fraternity
Tau Beta Pi, National Engineering Honors Association

PUBLICATIONS

Hampton, D., J.S. Jin, and J.P. Black, 1980, "Representative Ground Parameters for Analysis of Tunnels: Vol. 3, Tunnel Design and Construction," Report FHWA/RD-80/014.

ROBERT S. MARKWELL
ENVIRONMENTAL SCIENTIST

EDUCATION

B.S., 1984, Environmental Resource Management, The Pennsylvania State University

PROFESSIONAL EXPERIENCE

1987 to Present: Mr. Markwell is an Environmental Scientist in the Engineering and Project Development Division of Remcor. In this position, he coordinates field sampling activities and provides technical input on project reports. Experience at Remcor includes the following:

- Assessment of polychlorinated biphenyl (PCB) and solvent contamination of soil and ground water at an electrostatic capacitor manufacturer.
- Development of a sampling program and assessment of chemical data for a remedial investigation (RI) of a solvent-contaminated ground water site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or Superfund.

1985 to 1987: Mr. Markwell served as an Environmental Health Specialist for NUS Corporation in Pittsburgh, Pennsylvania. Key contributions included the following:

- Produced six Resource Conservation and Recovery Act (RCRA) Facility Assessments that involved assessing over 200 treatment, storage, and disposal units.
- Developed a report for RCRA Regulatory Assistance on characterization of leachates from co-disposal landfills using both field and published data.
- Completed three Environmental Risk Assessments for National Priority List Superfund site RIs. Analyzed chemical data and physical site features to assess occurrence, distribution, and migration of contaminants and to formulate risks to potential receptors.

1984 to 1985: Mr. Markwell served as a Field Operations Team Leader for NUS Corporation. In this role he coordinated and led soil, water, and waste sampling programs on 18 Superfund sites in four EPA regions and on five RCRA industrial sites.

TRAINING

Mr. Markwell successfully completed the following:

- Waste Site Supervisor Health and Safety Training (December 1987)
- Superfund 40-Hour Health and Safety and Field Instruments Training (October 1984)
- EPA Organic and Inorganic Data QA/QC Validation Seminar (January 1988)

OLD SPRINGFIELD LANDFILL SITE
RESPONSIVENESS SUMMARY
DETAILED RESPONSES

PRP COMMENTS

Comments on the Preferred Alternative

COMMENT NO. 1: The selection of the 10^{-7} incremental cancer risk as the target risk level does not appropriately reflect site characteristics and is not consistent with recent EPA Region I policy at other sites.

RESPONSE:

> EPA did not select the 10^{-7} incremental cancer risk as the target risk for this operable unit for seeps. EPA choose target risk levels between 10^{-4} and 2×10^{-6} for groundwater cleanup which are within the risk range of 10-4 to 10-7 Superfund remedies, and is consistent with recent EPA Region I policy at other sites.
>
> Because this remedy does not address source control EPA does not think it is apprporiate to respond to this concern as it relates to source contol.

COMMENT NO. 2: The remedial investigation does not support the need for the capping of the landfilled wastes to protect against future ingestion of bedrock ground water to the east of the former landfill.

RESPONSE:

> Because this remedy does not address source control, EPA does not feel it is appropriate to respond to this comment at this time.

COMMENT NO. 3: The remedial investigation does not support the need for capping of landfilled wastes to protect against offsite exposure via inhalation of chemicals in landfill gas.

RESPONSE:

> See EPA response to comment 2 above.

COMMENT NO. 4: The outslopes of the former landfill should not be capped.

RESPONSE:

> See EPA response to comment 2 above.

COMMENT NO. 5: The potential risk associated with contact with contaminated surface soils suggests covering and fencing approximately 1.5 acres of the former landfill to address a target risk level of 10^{-6}.

RESPONSE:

See EPA response to comment 2 above.

COMMENT NO. 6: Selection of cap configuration should be made on the basis of studies performed during remedial design.

RESPONSE:

See EPA response to comment 2 above.

COMMENT NO. 7: The data developed in the remedial investigation do not support the need for excavation of areas beyond the limits of the former landfill and consolidation of these materials under the proposed cap.

RESPONSE:

See EPA response to comment 2 above.

COMMENT NO. 8: The design of the leachate collection system on the eastern side of the site should be modified to address the collection of those seeps evidencing contamination, and the instability of the eastern outslopes should be considered in locating the collection system.

RESPONSE:

REMCOR appears to take issue with the proposed design of the eastern leachate collection system for a number of reasons:

- o Questionable stability of outslopes affecting construction and system maintenance.
- o Effect on aesthetics and slope stability caused by required clearing and grubbing activities.

Stability of Outslopes: It is recognized that steep cuts will be required to construct the collection system as proposed. However, as the excavations would be backfilled as soon as possible after construction of the drainage system, only short-term stability of the excavation should be a matter of concern. Specific precautions required to ensure short-term slope stability, such as bracing, benching, or flattening of slopes, should be explored during the Remedial Design. REMCOR also expresses concerns for long-term stability of the slopes (REMCOR, Page 28). The ROD specifies performance standards which may allow for an alternative collection system design. Slope regrading operations to be performed in conjunction with capping operations should increase slope stability in areas of marginal stability, thereby minimizing these concerns.

Effect on Clearing and Grubbing on Aesthetics and Slope Stability: REMCOR concludes that performing necessary clearing and grubbing operations would "exacerbate problems associated with stability of the slopes and would blight the landscape in the area." (REMCOR, Page 28).

The areas to be cleared and grubbed are not visible to a large extent from either Route 11 or from the trailer park due to topography and vegetative cover. Since visual observation of these areas is obscured to a large extent, it is uncertain how operations "would blight the landscape." The proposed operations are very similar to those associated with a utility right-of-way.

They also express a concern that clearing and grubbing operations will "exacerbate problems associated with stability of the slopes." The vegetation currently present on the slope adds little to the overall stability of the slope. As such, we are of the opinion that removal of such vegetation should not affect overall slope stability.

COMMENT NO. 9: Placement of interceptor wells along Will Dean Road into the sand and gravel water-bearing zone should be reevaluated.

RESPONSE:

The EPA recognizes data for the design of the well extraction system is currently not available. Further evaluation is recommended in the FS (FS 7-127). Specific items to be designed include number of extraction wells, well placement, and extraction rates.

Placement of these wells along Will Dean Road will permit the western waste management boundary to be placed along Will Dean Road and closer to the source area, rather than at the western leachate seeps. This will allow the homes west of Will Dean Road to be excluded from the waste management unit.

APPENDIX 2

Administrative Record Index
not included.

APPENDIX 3

tate of Vermont

[illegible] Fish and Wildlife
partment of Forests, Parks and Recreation
partment of Environmental Conservation
he Geologist
tural Resources Conservation Council

AGENCY OF NATURAL RESOURCES
103 SOUTH MAIN STREET
Waterbury, Vermont 05676

Department of Environmental Conservation

802-244-8755

September 21, 1988

Michael R. Deland
Regional Administrator
U.S. Environmental Protection Agency
Region I
John F. Kennedy Federal Building
Boston, Massachusetts 02203

Re: Old Springfield Landfill -
Concurrence with ROD for
Operational Unit

Dear Mr. Deland:

The Agency of Natural Resources (Agency) has reviewed the preferred remedial action alternative that EPA is recommending for an operational unit at the Old Springfield Landfill Federal Superfund site. The Agency concurs with the selection of the preferred alternative for the unit.

The Agency has evaluated EPA's preferred alternative for consistency with state law and has determined that it is consistent with state statutes and regulations currently in effect. Please note, however, that the state Groundwater Protection Rule and Strategy will take effect September 29, 1988. Any additional remedial action for source control or migration of groundwater will be evaluated for consistency with this rule.

The Agency looks forward to working with you in implementing the preferred alternative. If you have any questions or require additional information please contact Reginald (Tex) LaRosa at 802-244-8755.

Sincerely,

Patrick Parenteau

Patrick A. Parenteau
Commissioner

PAP:arm
12

COMMENT NO. 11: The slurry wall proposed by EPA as an option within the preferred alternative would have limited effectiveness.

RESPONSE:

As part of this ROD, additional studies will be done to determine the feasibility of diverting groundwater from contact with the waste. The evaluation for the effectiveness a slurry wall will be determined at that time.

Date: 9/21/88

State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
Natural Resources Conservation Council

AGENCY OF NATURAL RESOURCES
103 SOUTH MAIN STREET
Waterbury, Vermont 05676

Department of Environmental Conservation

CONFIDENTIAL

July 19, 1988

MANAGEMENT BRANCH

JUL 20 88

Ms. Paula Fitzsimmons
U.S. EPA, Region I
Hazardous Waste Division (HPS-1)
J.F. Kennedy Federal Building
Boston, Massachusetts 02203

Dear Ms. Fitzsimmons:

We have reviewed EPA's proposed cleanup plan for the Old Springfield Landfill, and have the following comments.

We recognize the considerable efforts expended by EPA and EPA's contractors on this site. The collection and analysis of an enormous amount of data has resulted in a much better understanding of the nature and extent of the contamination problem. However, we feel that some important information is still lacking, and we question EPA's ability to design and implement an effective remedy without this critical data.

Specifically, we feel that EPA's investigations should be expanded to characterize the bedrock hydrogeology east of the site. We are concerned that without an understanding of this potential pathway for contaminant movement, there may still be an unidentified risk to public health and the environment. Without an understanding of these risks, it is not possible to determine if additional remedies such as extraction and treatment of groundwater from the bedrock might be necessary.

Also, EPA's investigations should identify and define waste disposal areas on the western side of the site. Risks associated with this problem need to be characterized, and specific remedial actions proposed if warranted.

The state of Vermont has brought these concerns to EPA's attention on numerous occasions. Both the Vermont Department of Environmental Conservation (DEC) and the Vermont Department of health (DOH) have repeated these concerns to EPA upon review of virtually every major work plan and report produced by EPA's contractors.

Regional Offices - Barre/Essex Jct./Pittsford/N. Springfield/St. Johnsbury

Following are comments on the major elements of EPA's proposed plan. Please note that because detailed design specifications are not available, it is not possible to provide detailed comments on the specifics of each component of the proposed remedy.

Capping

While capping will reduce the amount of precipitation infiltrating through the contaminated materials, it will do little to prevent the lateral movement of groundwater through the wastes. This groundwater will continue to migrate, emerging at the leachate seeps and/or traveling downward through the overburden and into the bedrock. Because groundwater will continually leach through the contaminated materials, the proposed leachate collection systems may need to be operated and maintained virtually indefinitely. Also, because the bedrock hydrogeology east of the site has not been adequately characterized, that portion of the contaminated groundwater which reaches the bedrock may present a continuing threat to public health and the environment.

This portion of the remedy includes removing some of the contaminated materials from outlying waste areas and consolidating it within waste areas 2, 3, and 4. Waste areas on the western side of the site have not been delineated, and the volume of these materials which may need to be removed and consolidated is unknown. The costs associated with that effort have not been included in the estimated total costs.

Concerning the outlying waste areas which EPA has identified, the plan proposes to remove contaminated materials from these areas down to a depth of either 4.5 or 9.5 feet. The rationale for selecting these depths is unclear. For example, contaminated materials from an area in the northwestern portion of the site will be removed to a depth of 4.5 feet, yet only surface soil samples were collected from this area. The depth of contaminated materials in this area is unknown. Also contaminated materials from waste area 1 will be removed to a maximum depth of 9.5 feet, yet samples collected from below this depth were not analyzed. The depth of contaminated materials in this area also appears to be unknown. The plan also proposes to remove contaminated materials from the steep slopes of waste areas 2 and 3, and the depth to which these materials will be removed is not specified. Since these areas will not be capped, any contaminated materials remaining below the planned excavation depths will continue to leach contaminants into the groundwater. These issues must be resolved in the remedial design.

Continuous Leachate Seepage Collection and Treatment

EPA's "Draft Final Supplemental Remedial Investigation Report" concludes that a portion of the contaminated groundwater from the eastern waste areas travels through a deep sand and gravel deposit and discharges as leachate seeps along the base of the western slope. This component of the remedy includes both groundwater extraction wells to remove contaminated groundwater from this sand and gravel unit, and construction of a leachate collection system on the west side. If, as EPA's report concludes, all of the contaminated groundwater moving through the sand and gravel unit discharges to the western seeps, then it appears that the extraction wells may not be necessary. Final determination of need should be made in the remedial design.

This portion of the remedy includes pumping collected leachate to a treatment system to be constructed on the site. It is stated in the proposed plan that "adequate information has not been received by EPA to evaluate whether the Springfield town treatment plant has the capacity or ability to treat the contaminants associated with the site..." The DEC notified EPA that additional specific information was necessary before the DEC could help determine if the town treatment plant could accept and treat leachate from the site. That information has not been provided to the DEC. It may be possible that with proper pre-treatment, the collected leachate could be accepted by the town treatment plant, thereby lowering the construction, operation, and maintenance costs associated with this portion of the remedy.

Two issues are still under consideration by the state. As indicated in Commissioner Parenteau's letter of June 28, 1988, we do not presently have sufficient information to conclusively resolve the historic ownership and operation issues and the resulting state cost exposures. Also, we are concerned about the lack of permanence of EPA's proposed remedy. Section 121(b) of the Superfund Amendments and Reauthorization Act of 1986 (SARA) requires that EPA give preference to remedies that permanently reduce the toxicity, volume, or mobility of the hazardous substances at a site. Capping wastes, restricting access, and collecting and treating leachate are not permanent remedies. These remedies rely heavily on operation and maintenance activities that may have to operate virtually indefinitely and which could place a large burden on the already limited resources of the state of Vermont and the town of Springfield.

We have discussed EPA's proposed plan with the DOH, and their concerns are included in this letter. The DOH will also be sending written comments to EPA after they have received and reviewed the final reports on which this proposed plan is based.

Please contact me with any questions regarding these comments.

Sincerely,

Tom Moye

Tom Moye
Hazardous Materials Management Division